

**COMMENTS AND RESPONSES
TO THE OU4 IM/IRA
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VI.5-34 Section VI.5.3.5 **Comment:** The data presented in Section II.3.5.4.3 (Seismic Refraction Data Results) indicate that the paleochannels incised into the top of the bedrock are reasonably well defined, and that the depth to the top of the alluvial water table has to be relatively shallow. The shallow depth, along with the elevated nitrate and nitrite levels that have been detected in the alluvial ground water may respond well to an EM survey (e.g. EM-31) to delineate the area encroached by the ground water (defining the preferential pathways), and to determine if contaminated plumes have migrated beyond the ITS. It would appear feasible to run an EM test line prior to initiating the refraction and/or GPR surveys.

Response: An EM survey has been added to the FSP.

V.I.5-34 18 **Comment:** The goals of the seismic refraction survey should be achievable using only the compressional wave survey. What is the advantage of the shear wave study?

Response: Unlike compressional waves, shear waves do not refract from the water table. Thus, the comparison of the two data sets should allow the water table to be mapped. Furthermore, comparison of the compressional and shear wave velocities can, in some cases, be used to qualitatively interpret gross lithologies.

VI.5-37 Par. 1 **Comment:** The most pertinent information shown on Figure VI.5-3-7 is based primarily on the data from the drill holes, except for the contact between the unweathered bedrock and the semi-consolidated bedrock. There is no documentation or examples of the refraction data to indicate that the refraction survey is actually effective in mapping bedrock channels as claimed. It is also apparent that without the drill data it would not have been possible to differentiate between the "primarily fine grained alluvium" (V=1300 fps) and the "sandy alluvium" (V=1300 fps) as shown on the section. The lithology logs for these holes indicate that there are lateral facies changes within the alluvium. Would it be more appropriate to use one designation for the alluvial section since the velocities are apparently constant?

Response: The refraction data was used to delineate the following: the contact between the alluvium and weathered bedrock; the contact

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between weathered and unweathered bedrock; and the near surface layer on the eastern end of the line. The geophysical data were then supplemented with existing well data.

VI.5-37 Par. 2 & 3

Comment: Why is it understood that 10 foot geophone spacing is not adequate? Shouldn't a test line be run to compare the resolution between a 10 foot spacing as compared to 5 foot phone spacing?

Response: Decreasing the geophone spacing decreases the distance between the subsurface sample points allowing the contacts to be mapped more precisely. Additionally, the smaller geophone spacing will allow thinner layers to be resolved.

VI.5-37 Par 3

Comment: P wave refraction breaks should provide the data requirements outlined in paragraph 3. What is the purpose of a shear wave study, and will a separate study be conducted to acquire this data?

Response: See response to comment VI.5.34, line 18.

VI.5-34&37 VI.5.3.5.1

Comment: Line placement rationale is not discussed anywhere in this section. What is the purpose of the excessive overlap of lines A-A' and C-C'? Line D-D' is designated as both a refraction line and a GPR line. As a refraction line it essentially duplicates the data on phase 1 lines 6 and 7. Why not tie these lines together with a short line, and extend line 6 to the west as needed and eliminate line B-B' (Also designated as a refraction and GPR line), and extend line 7 to the southeast as needed. It appears that line G-G' would be needed only if a paleochannel trending almost due east is found on line H-H'.

Response: The lines are overlapped to allow the all lines to be properly correlated. Refraction data is proposed along the entire length of Line D because the aquifer conditions have changed since the data was acquired. The Phase II refraction survey should allow the water table to be mapped. Furthermore, the Phase I lines were not precisely located, and tying the Phase II data to Phase I data would be difficult. Data from Line G will tie lines C, D, E, and F. Furthermore, this data will be used to map any paleochannels which originate to the east of Line H.

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VI.5-37 VI.5.3.5.2

Comment: Drill hole data to the northeast of Phase 1 lines 6 and 7 indicate that the alluvium is becoming more clayey. This can have the effect of attenuating the effective GPR penetration. Should test lines be conducted on a portion of line F-F' as well as within the ITS to produce a possible worst case-best case scenario so data quality can be compared. Also, if the GPR data does provide better resolution of the paleochannels incised into the top of the bedrock, will a refraction survey be essential other than to map the unweathered bedrock contact?

Response: Variations in GPR data quality are expected as the properties of the subsurface vary. Data quality will be judged from the quality of GPR data along Line D. GPR, even if successful in mapping the bedrock surface, may not be useful in mapping the water table. The refraction survey should allow the water table, top of weathered bedrock, and top of unweathered bedrock to be mapped.

VI.5-40 5-8

Comment: This section mentions that borehole geophysical methods will be considered to estimate the hydraulic conductivity, but only the heat pulsing flow meter is discussed. Will other geophysical methods or logs be used? If so, what other tools are being considered?

Response: The only borehole geophysical methods proposed in the FSP is the heat pulsing flow meter. This tool will be used only if the data provided by slug and pumping tests prove useful.

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Comment # **Commentor:** DOE-HQ **Part:** VI

GENERAL

1 **Comment:** The presentation of the site data was consistent and clear. There was an adequate use of supporting data for the conclusions drawn and where necessary the uncertainty regarding the interpretation was presented.

Response: No comment.

2 **Comment:** Several items were not addressed in this document: 2A-2F

2A **Comment:** There are no ARARs listed.

Response: To conform with all other work plans at RFP, the Sitewide Benchmark Tables have been added, as Appendix C.

2B **Comment:** There is no discussion of laboratory deliverables.

Response: The laboratory deliverables are presented to the agencies in EG&G's GRRASP document. This document applies to all OU's and all laboratories utilized by EG&G.

2C **Comment:** There is no discussion as to whether any samples must be field filtered, such as water samples for metals analyses.

Response: The FSP has been revised to specify filtering of the metal analytes in the field.

2D **Comment:** There is no indication if cyanide analyses should be performed. Performing the Target Analyte List may or may not suggest cyanide analysis.

Response: The FSP has been revised to specify cyanide analyses.

2E **Comment:** An exact listing of analytes should be included in this document,

as this changes with methods and statements of work.

Response: The FSP has been revised to list analytes and specific methods.

2F **Comment:** There is not discussion of data validation procedures to be followed. If SW-846 methods are performed, as suggested in some places, there are currently no validation guides for these methods.

Response: The validation procedures for all RFP analytical work is presented by EG&G in the GRRASP and is not duplicated in each work plan.

2G **Comment:** There should be a discussion of format and contents required for the final report on this work.

Response: The work plan has been revised to include a discussion of the format and contents of the final RFI/RI report. This discussion is presented in Section 4.6 of this work plan.

2H **Comment:** This is not a "stand alone" document as is usually required by regulatory agencies. It continually references other documents, not included in this document.

Response: This document has been revised to be a "stand-alone" document. Originally, it was Part VI of the IM/IRA document, and the authors were requested to cross-reference, rather than duplicate information.

SPECIFIC COMMENTS

1 **Comment:** Section VI.3.1, p. VI.3-1: the information from the earlier studies has been summarized in the Phase I Work Plan. Most of this information should be referenced to that document. The most pertinent information is related to the present understanding to the contaminant distributions and source area. Recommend deleting the discussion on the historical investigations.

Response: The historical discussion has been streamlined, but must remain in the work plan as part of the effort to make this a "stand alone" document. (see 2H above)

2 **Comment:** In Table IV.5.2.1, analyses shown do not match with those compounds previously found at the site and discussed in previous

chapters of this document. For example, americium is not the only radiochemical compound found in previous work and there is no discussion of nitrate/nitrite found previously.

Response: The inconsistencies in data summaries have been corrected.

3 **Comment:** There are several comments on Table VI.5.5-1.

3A **Comment:** The reason for listing two different holding times for volatile organics is unclear.

Response: The holding times are dependent on the laboratory method and field preservation. The 7 day holding time complies with the RFP CLP requirements (no preservation). If the EPA method 524 is allowed, preservation is allowed, extending the holding time out to 14 days. The table has been clarified.

3B **Comment:** The holding time for anions is dependent on the analytical methods to be performed, and the exact methods to be performed have not been indicated.

Response: The table has been revised to provide exact methods and holding times.

3C **Comment:** Normally the holding time for total dissolved solids is 7 days. If the 48 hours listed is to be followed, the laboratory must be notified of this change in method, or holding times may be missed.

Response: The table has been revised to 7 days.

3D **Comment:** The holding time of radionuclides is actually dependent on the half-lives of compounds of interest, and is not set at 180 days as shown.

Response: While a holding time of more than 180 days may be technically supportable, it is not in the interest of the schedule for this project, and therefore was not presented.

4 **Comment:** In Table VI.5.5-3, the frequency of trip blanks is one per cooler containing samples for volatile organics analyses, and not 1/20 as shown.

Response: The table has been revised.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI-i		Comment:	(E) Table of Contents format is difficult to read.
		Response:	Efforts have been made to simplify the TOC.
VI.1-1	4	Comment:	(E) The RFI/RI is also Phase II of the CERCLA RI.
		Response:	Correction made.
VI.1-3	30	Comment:	(E) Plural agreement: data have
		Response:	This typographical error has been corrected.
VI.1-4 and VI.1-3	5 79	Comment:	(N) Characterization of the groundwater must consider the potential impact of contaminants in the soil and vadose zone on the groundwater.
		Response:	This comment is acknowledged. These considerations were made and presented in Section 3.
VI.2-1	18-28	Comment:	(N) The definition of the UHU is not consistent with the 1993 RCRA Annual Groundwater Monitoring Report (pg 1-7). The RCRA groundwater report provides the more regulatory acceptable definition.
		Response:	UHSU references have been revised.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.2.1-2	15	Comment: (E) Were semivolatiles and/or other inorganics detected in groundwater samples?	
		Response: These contaminants were not detected, and that is why they were not mentioned. The text has been rewritten to further simplify.	
VI.2.1-2		Comment: (E) The potentiometric surface lines do not agree with those shown in Figure VI.3.1-3. Additionally, the reader should be provided with potentiometric surface maps illustrating seasonal variation (i.e. the highest and lowest saturated thickness). The maps also do not conclusively support the statement that the bedrock topography controls the groundwater flow direction (pg V1.2-1 and Figure V1.2.1-3). Cross-sections may help clarify the relationship between the alluvial and bedrock aquifers and the stratigraphic units.	
		Response: The maps have been revised.	
VI.2.1-2		Comment: (N) The southeasterly flow direction was not well emphasized in Part II Section 3 regarding source and soil characterization. The groundwater flow system is not well summarized. The reader could be referred to specific sections of II.3 or the information could be resummarized. See for example, the discussion regarding Figure II.3.5-14.	
		Response: Revisions have been made.	
Figure VI.2.2-1		Comment: (E) The figure is difficult to read. The legend does not define what the drainage basin identification symbols, does not show Great Western Reservoir,	

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and does not identify the location of OU4 (cf. to text; pg VI.2-4 lines 36-43 and text on p. VI.2-13 and VI.2-14).

Response: This figure has been revised to reflect the comment.

VI. 2-4 3-5 **Comment:** (S) Here, and in Figures VI.2.1-2 and VI.2.1-3, the reference is to flow in alluvial materials and bedrock. yet on page VI.2-1 the discussion is about the lower and upper HSUs. The discussion and illustration of flow should be consistent with the earlier discussion on hydrogeology. In Section VI.2.1 it's not clear that weathered bedrock is part of the upper HSU. It's also unclear under what circumstance the sandstones of the Arapahoe Fm. are in the upper HSU as opposed to the lower HSU.

Response: Clarifications have been made and a table added to illustrate the referenced circumstances.

VI.2-4 15 **Comment:** (N) It is not clear in the text how Figures V1.2.1-4 through VI.2.1-8 were developed (i.e. # of samples/wells, sampling interval and parameters analyzed). Why are radionuclides depicted by U^{233} and U^{234} only for the alluvial aquifer and all radionuclides are lumped together for the bedrock aquifer? The figures do not show contaminant concentrations for all parameters in both the alluvial and bedrock systems and therefore, appear incomplete.

Response: The radionuclides were presented this way because the source data (RCRA reports) present it this way. Clarifications have been made in both text and figures.

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VI.2-4	20-22	Comment:	(S) It appears that figures VI.2.1-4 and VI.2.1-5 illustrate slightly different parameters. Why is this? Also, the figures seem to illustrate upgradient activity to the southwest. Why is this not mentioned?
		Response:	Again, the presentation reflects the source of the information, the RCRA reports. The text has been revised to reference the southwest activity.
VI.2-13	5,23,30,35	Comment:	(E) Reference not provided in Section 10. (it is assumed that references in the remaining sections of the text will be provided as indicated in V1.7-1).
		Response:	References have been provided.
VI.2-13	12	Comment:	(E) Ponds A-1 and A-2 are the western-most ponds.
		Response:	This correction has been made.
VI.2-13	27-36	Comment:	(S) Reference is made to the mound and A03 Pad Areas. Their illustration on a figure may be appropriate.
		Response:	These features have been delineated on the preceding map.
VI.2-14	5-21	Comment:	(N) The design and relationship of Bowman's Pond and the West Collector of the ITS should be discussed in the main part of the document to understand the nature of historical releases. This needs to be discussed in Part II Section 3 as well as

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it may account for the soil contaminant levels present.

Response: At agency request, the ITS is presented as Appendix A and Bowman's Pond is presented as Appendix B.

General

Comment: (E) The tables and figures are mixed with the text. In Part II, they followed text. Standardization of the format is suggested.

Response: Standardization is not required as the work plan is no longer part of the IM/IRA document. Because of the number of figures in this document, it was deemed most appropriate to include the figures in the text. This was not the case in Part II.

VI.3-1

41

Comment: (E) Suggested change to.....construction in 1960, 1961, and 1970....

Response: Change made as requested.

VI.3-2

Comment: (S) Suggest clarifying in the summary column that the authors identified the underlying strata as the Laramie formation but more recent studies indicate the strata as belonging to the Arapahoe formation (if this is correct).

Response: The text is a summary of the 1952 report and is not a summary of current formation name usage. The Phase I RFI/RI report (Part II, Section 3.5) document covers this subject in depth.

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VI.3-3

Comment: (S) Suggest locating on a map or discussing in text the drainage tiles east of Ponds 207A and B as discussed in the summary column. The impact the drains may have had in contaminant fate and transport should be discussed in relation to the contaminants found in the soil (Part II, Section 3) and in the groundwater. This area may need to be targeted as requiring further investigation under the Phase II RFI for OU4 and should then be appropriately addressed in the FSP.

Response: Locations of the drainage tiles east of 207A pond and east of the 207B series ponds are discussed in Table VI.3.3-3 and the corresponding surface water sampling locations (into which the drainage tiles discharge) are shown on Figure VI.3.3-23. The comment relating to Part II, Section 3 will be relayed to the appropriate authors. Samples are currently being collected from the surface water sampling stations (into which the drainage tiles discharge) as part of the RFP site wide surface water monitoring program. Results from the sampling will be included in the Phase II report.

VI.3-5

Comment: (S) Suggest locating the drainage tile north of Pond 207C. See above comment.

Response: The surface expression of this drainage tile was added to Figure 3.3-23, Location of Seeps in OU4.

VI.3-6

Comment: (N) It is not clear where the two areas referenced in the comments column are located. It is potentially significant hydrogeologically that a tributary was located in the OU4 area prior to construction in the 1970's. The tributary should be identified on a map

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and the significance of its presence hydrogeologically should be discussed. Additionally, its potential impact on contaminant migration (soil and groundwater) should be discussed.

Response: The report summarized here studied the site suitability for building 371/374 which is located approximately 1700 ft. west of the Pond 207-C and well outside the OU4 boundary. The tributary in question is located immediately east of Building 371/374, west of Building 771 and drains to the northeast into North Walnut Creek near Building 771. The tributary has been partially filled in for various construction projects. Any surface water or ground water from this tributary would discharge into North Walnut Creek upstream of the OU4 boundary.

The comment column has been re-written for clarity.

VI.3-7

Comments: (S) Suggest clarifying where the Pierre Shale occurs on site or if it was improperly identified.

Response: Table 3.1 is a review of related previous investigations at Rocky Flats. Resolving details presented in those reports is considered beyond the scope of this Phase II Work Plan. The interested reader may refer to the "Draft Final Geologic Characterization Report for Rocky Flats Plant, Golden, Colorado" for details of site stratigraphic nomenclature.

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VI.3-8 **Comments:** (E) The first sentence in the summary column requires clarification. The location of the bifurcated drainage should be provided.

Response: The sentence in question was re-written for clarity. The location of the bifurcated drainage (northeast of the 207B Ponds) was added to the "OU4 Pertinence" column. Note: A bedrock contour map showing bedrock topography (ie. drainage channels) has been added to the work plan.

VI.3-9 **Comment:** (E) The text was left incomplete under the summary column.

Response: Table was reprinted with complete text.

VI.3-13 **Comment:** (N) The report identifies sand (likely sandstone) near Building 779. This is not consistent with Figure II 3.5-16 in Part II. Do the Part II text and figure need revising?

Response: The text and figure do not need revising. The sand is identified at building 788, not Building 779. Claystone is identified at Building 779.

VI.3-22 **Comment:** (E) ERM-Rocky Mountain, Inc. was also a contributor to the Historical Release Report.

Response: Both ERM-Rocky Mountain, Inc. and CH2M Hill contributed to the Historical Release Report as well as the parties already mentioned. However, official versions of this document do not refer to any of the subcontractors that worked on the document. Thus,

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the most correct method of referring to this document is simply DOE, 1992. The reference has been changed to read simply "DOE". The date has been changed to 1992, from 1991.

VI.3-23 33 and 42 Comment: (E) The locations of the ITS trenches and pumps (or sumps) should be shown on a figure.

Response: This information is provided in Appendix A, Figure VI.A-3 of this document. (Note: This appendix was added later and was not included in the round table review copy.)

VI.3-24 5-6 Comment: (E) Please clarify this sentence.

Response: The sentence had been modified for clarity.

VI.3-24 16 Comment: (E) Suggest the following wording for clarification...several solutions were presented to mitigate the problem including the following.

Response: Change was made as requested.

VI.3-24 32 Comment: (E) It is not clear what the Water Control and Recycle program was.

Response: The program focused on control and monitoring of subsurface and surface waters on the Rocky Flats Plant Site in an attempt to achieve zero discharge from the plant site. In addition, it analyzed the proposed water recycle system for non-process wastewaters and evaluated the effects of certain

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types of natural disasters on water control and recycle. The text has been modified to provide more detail regarding this study.

VI.3-25 19 **Comment:** (N) The open beds for brine storage should be discussed in Part II Section 2 or 3 as a potential source of soil contamination as well as in Part VI as an area of further investigation to determine the potential impact on groundwater.

Response: The Part II Section 2 or 3 comments will be forwarded to the group responsible for those comments. Several proposed alluvial wells (A-3, A-9, A-10 and A-11, Figure 5.3-1) are located to evaluate potential migration pathways southeast of the Solar Ponds toward South Walnut Creek.

VI.3-25 19-22 **Comment:** (S) As illustrated in Figure VI.2.1-6, alluvial groundwater at this location is characterized by elevated levels of nitrate/nitrite. Is this related to the brine storage? If so, it may be appropriate to mention it here.

Response: One objective of the Phase II Work Plan is to "Characterize contamination in OU4 ground water systems." Ground water contaminant levels in OU4 will be addressed in the Phase II RFI/RI report. Also refer to related comment response above.

VI.3-25 26 **Comment:** (E) Syntax error: 207-A, Pond

Response: Change was made as requested.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.3-27	37	Comment:	(S) It is suggested that the location and layout of the prefrench drain system and seeps be illustrated on map. Additionally, the area where 25 feet of fill was applied should be identified (p. VI.3-27, line 4).
		Response:	A seep map is provided in Figure 5.5-3 of this Phase II Work Plan. A cut and fill map is provided in Figure II.3.5-4 of the Phase I RFI/RI report. The location of pre-french drain trenches and sumps is shown in Figure 2-2 of the Phase I Work Plan. It was determined to be inefficient to include every figure from the Phase I report or the Phase I Work Plan into the Phase II work plan.
VI.3-28	13	Comment:	(S) Suggest reviewing the regulatory requirements for groundwater monitoring at RCRA facilities with surface impoundments, especially with a known release (nitrates, radionuclides). RCRA 265 and 264, Subpart F require groundwater monitoring and corrective action, if found necessary. The SEPs did not require a Part B operating permit because they were being closed and thus required discussion in the RCRA Post Closure Care permit.
		Response:	This text has been revised, deleting the phrase "although not required by law."
VI.3-30	4	Comment:	(N) The text discusses contaminants present in soil at concentrations greater than background. The text does not agree with Part II Section 6 Figure II.3.6-1 which shows where contaminants of concern are present at concentrations greater than Target Cleanup Levels. Also, this section of text does not

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agree fully with text on pg. II.6-2 in Part II regarding surficial soils.

Response: The differing objectives of the Phase I RI Report and the Phase II Work Plan are the reason for presenting detections at different levels of occurrence. However the Work Plan has been revised to use Phase I criteria as appropriate.

VI.3-30 16 **Comments:** (N) The text states that the sediment overburden is relatively shallow (average depth approximately 6 feet). Does overburden refer to thickness and if so, Figure II.3.5-6 indicates an average thickness closer to 15 feet? Table VI.3.2-1 should be checked against the above figure and associated text.

Response: The first sentence in the paragraph (line 16) is in error and has been deleted from the text. The 6.2 feet value in Table 3.2-1 (and 13.5 feet value in Table 3.2-2) is average *sample* depth for alluvial (and bedrock) samples. The tables have been corrected accordingly. The average unconsolidated materials thickness of 15 feet shown in Figure II.3.5-6 is considered correct.

VI.3-30 16-29 **Comments:** (N) The discussion does not fully agree with discussion presented in II.5-8 regarding sorption of radionuclides in Section II.3.3.6.1. Also, the discussion does not address the four lithofacies described in Part II Section 3.

Response: Average values of 30 meq/100 grams of soil are listed in both the Phase II Work Plan (page 3-30, line 23) and in the Phase I report page (II.3-83, line 29). The geotechnical properties are summarized in

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the Work Plan. Detailed discussion at the lithofacies level was considered detail unnecessary to the Work Plan.

VI.3-31 Tables
VI.3-32 VI.3.2-1
 VI.3.2-2

Comment: (S) If the depth of alluvial materials (alluvial thickness) is typically 6.2 feet, shouldn't the typical depth to bedrock be the same? Or are you talking about depth to alluvium? If the latter is the case, what's overlying it?

Response: The values 6.2 feet (Table 3.2-1) and 13.5 feet (Table 3.3-2) represent average *sample* depth and not depth to alluvial or depth to bedrock. The tables have been corrected accordingly. See comment response above VI.3-30, line 16.

VI.3-32 6

Comment: (N) The text appears contradictory to Section II.3.3.6.1 in Part II.

Response: An average CEC value for bedrock of 39 was substituted for the value of 42 originally found in Table 3.2-2 of the Work Plan. The value of 39 appears in the Phase I report (page II.3-83, line 30).

VI.3-32 25-28

Comment: (S) Suggest moving the discussion regarding hydraulic conductivities from the soil data discussion to the following Section VI.3.3.1 Groundwater Hydraulics.

Response: Change was made as requested.

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VI.3-32 and VI.3-33	34-39 1-3	Comment:	(E) The text does not necessarily agree with the interpretation of the Uppermost Aquifer in Section 1.3.1 of the 1993 RCRA Annual Groundwater Monitoring Report (2/1994).
		Response:	The text has been modified to be consistent with the 1993 RCRA Annual Groundwater Monitoring Report and the 1993 Groundwater Protection and Monitoring Program Plan.
VI.3-33	1-2	Comment:	(S) This gets a bit confusing here. What differentiates the alluvial unit from the unconsolidated unit? Also, where have these units been previously defined? Are Arapahoe Fm. sandstones considered unconsolidated where they are in contact with alluvial materials?
		Response:	The text has been modified to clarify this section. In addition, Figure 2.1-1, OU4 Hydrostratigraphic Column, has been added to help clarify the definition of Upper and Lower Hydrostratigraphic Units.
VI.3-33	21	Comment:	(S) If the groundwater system is described in terms of lower and upper HSUs, why then is this discussion related to alluvial groundwater?
		Response:	The term "alluvial groundwater" has been changed to "unconsolidated materials ground water" or "the unconsolidated materials portion of the Upper HSU", in order to be consistent.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.3-33	28	Comment	(S) 1×10^{-2} cm/s isn't really a low hydraulic conductivity.
		Response:	This paragraph has been re-written and the "low hydraulic conductivity" reference has been deleted.
VI.3-33	33-42	Comment:	(S) Suggest referencing the potentiometric surface maps used in the calculation of gradient, the source of the porosity values used and the equation used to determine the flow distances. Also, the hydraulic conductivity of 4×10^{-8} dm/s does not agree with Table VI.3.2-1. The gradients and flow velocities do not agree with those presented in Tables 3-2 and 3-3 of the 1993 Annual Groundwater Monitoring Report.
		Response:	This section has been re-written to include the equation for Darcy velocity and includes sources for some of the parameters used in that calculation. The hydraulic conductivity values were taken from Table VI.3.3-1. Gradients were calculated from 1992 Annual Groundwater Monitoring Report maps. The Annual Groundwater Monitoring Reports use selected values for hydraulic conductivity and effective porosity. Maximum and minimum values for hydraulic conductivity, gradient and assumed porosity were used to calculate flow velocity in the Phase II Work Plan in order to demonstrate the large potential variation in flow velocity values and the need for additional aquifer characterization data.

Figures VI.3.3-1 and

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VI.3.3-2

Comment: (E) The month of the quarter should be identified. Also, Figure VI.3.3-2 does not fully agree with Figure 3-5 in the RCRA Annual Groundwater Monitoring Report. The figures don't fully agree with Figures II.3.3-50 and 51 in Part II. The differences should be discussed. Because this is an RFI/RI; it is suggested that the potentiometric surface for each of the four quarters be provided.

Response: The month of the quarter has been added to the figures.

Figures VI.3.3-1 and VI.3.3-2 were generated from Figures 2-3 and 2-5 of the 1992 RCRA Annual Groundwater Monitoring Reports and 1993. The two sets of figures agree closely. Figures II.3.3-50 and II.3.3.51 from the Phase I RFI/RI report use 1993 data. Areas of unsaturated alluvium were generated by the intersection of a contoured water surface and a contoured bedrock surface. Where bedrock has a greater elevation than the water surface, the alluvium is mapped as unsaturated.

Since this document is a Phase II Work Plan, not an RFI/RI Report, potentiometric surface maps of two quarters are considered sufficient to illustrate general ground water flow patterns.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.3-36	24	Comment: (S) Alluvial thickness here should be consistent with Table VI.3.2-1.	
		Response: Table VI.3.2-1 was in error and has been corrected. The value 6.2 reflects average sample depth, not depth of alluvium.	
VI.3-36	40-41	Comment: (E) The text describes that the water level in well 3887 located south of Pond 207C South is sometimes greater than the pond liner yet the figures in this text and the RCRA groundwater report show it as being unsaturated. The discrepancy should be discussed.	
		Response: Lines 37 through 41 include statements such as "water levels...vary greatly between the wet and dry season" and "maximum water levels in wells adjacent to the 207-B Ponds are above the elevation of the pond floor." Analysis of the hydrograph (Figure VI.3.3-6) and potentiometric surface maps for low and high water (Figures VI.3.3-1 and VI.3.3-2) shows that water levels fluctuate between an elevation above the pond floor and an elevation below top of bedrock and below the bottom of the well screen. One sentence was added to this paragraph to clarify this comment.	
Figures VI.3.3-7		Comment: (E) There is a slight variation in the topographic lines near P209489 from Figure II.3.5-16.	
		Response: Slightly different versions of this figure were inadvertently used for Part II and Part VI documents. The figure has been modified in response to other comments. The modified version will appear in the Phase II Work Plan.	

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.3-43	13	Comment:	(S) Should the last 2 words on this line be "upper HSU"?
		Response:	This sentence has been re-written to read "Geologic data indicate that the lithology of the subcropping bedrock unit is mostly claystone throughout OU4."
VI.3-43	26	Comment:	(E) The hydraulic conductivity values do not agree fully with those in Table VI.3.2-2 and VI.3.3.1.
		Response:	I wouldn't expect them to. Hydraulic conductivity values in Table VI.3.2-2 (since moved to sections 3.3.1.1 and 3.3.1.2) are laboratory measured values collected from vertically oriented core samples. Values in Table VI.3.3.1 are from a variety of sources including aquifer pumping tests. The laboratory-measured values for unconsolidated materials and bedrock have been incorporated into the text in sections 3.3.1.1 and 3.3.1.2.
Figure VI.3.3-8		Comment:	(S) Suggest discussing the nature of the unsaturated areas located north of Pond 207A and near P213889.
		Response:	The weathered bedrock wells are dry at these locations. One objective of the Phase II work is to "characterize the alluvial and bedrock hydrologic systems and their interactions". A discussion on the nature of unsaturated areas in the weathered bedrock will be included in the Phase II RFI/RI report.
Figure VI.3.3-9		Comment:	(E) The 1992 fourth quarter potentiometric surface map differs from the 1993 fourth quarter map as

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provided in the 1993 RCRA Annual Groundwater monitoring report. It is suggested that an explanation be provided.

Response: It appears several wells which were wet in 1992 were dry in 1993, and 1993 contour lines are more conservative than 1992 contour lines. One objective of the Phase II work is to "characterize the alluvial and bedrock hydrologic systems and their interactions". An explanation of year to year changes in potentiometric surfaces will be addressed in the Phase II RFI/RI report.

VI.3-47 7-9 **Comment:** (S) This again is confusing because the term "aquifer" is used without regard to upper or lower HSU.

Response: The term "aquifer" has been replaced with "hydrostratigraphic unit."

VI.3-47 14-24 **Comment:** The text does not discuss the movement of water through macropores as emphasized in Part II. Fractures were somewhat deemphasized in Part II in contract to Section VI.3.3.1.3.

Response: Discussion of macropore flow has been added to section VI.3.3.1.1, "Ground Water of the Unconsolidated Materials Portion of the Upper HSU." Little is known about interactions between the Upper and Lower HSUs. An objective of the Phase II field work is to characterize Upper and Lower HSU interactions.

VI.3-50 3 **Comment:** (E) Should this be Well 2286?

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
		Response:	Is the page number here a typo? Page VI.3-50 is Figure VI.3.3-12, Geologic cross section B-B'. Please check the page number and re-submit for comment response.
VI.3-4a thru VI.3-53	Figures VI.3.3-11 thru VI.3.3-15	Comment:	(S) Where present, it would be nice to have the ponds labelled.
		Response:	The ponds have been labelled on figures VI.3.3-11 through VI.3.3-15
VI.3-55	35-43	Comment:	(S) Since it is stated earlier that subcropping sandstones are part of the upper HSU, where do they fall on figure VI.3.3-16?
		Response:	1st paragraph of VI.3.3.2.2 has been rewritten to address comment. VI.3.3.2.2 Sitewide Background Water Quality. Data on sitewide background ground water quality is presented in the annual Background Geochemical Characterization Report (EG&G, 1993). A total of 8 Rocky Flats Alluvium (RFA), 9 colluvium (COL), 12 weathered bedrock (WCS), 9 valley fill alluvium (VFA) and 9 unweathered bedrock sandstone (KAL or undifferentiated Cretaceous Arapahoe-Laramie formation) wells are included in this analysis. The areas within which these groups of ground waters plot on a trilinear diagram are adapted from the above report and illustrated in Figure VI.3.3-16. Clearly, the unweathered bedrock sandstones (actually water-bearing siltstones) are chemically unique relative to all other ground waters in background areas removed from any industrial influence. It should be noted, however, that two of the wells included in the Background Geochemical Characterization Report (op. cit.) were completed in the so-called "no. 1 sand" which is the uppermost lithologic unit of the KAR bedrock. This unit is in direct physical and hydrologic contact with the overlying unconsolidated material and as such is part of the upper HSU and chemically similar to ground waters of the upper HSU. This fact is acknowledged in the Background Geochemical Characterization Report and ground waters from these two wells plot in the same area on the trilinear diagram as do those from the VFA and other upper HSU units. Figure VI.3.3-16 does not include data from these two wells (see legend) and consequently the KAL area shown represents the major ion chemistry of ground waters from deeper water-bearing units of the bedrock only. Chemically, the RFA, COL, VFA, WCS and uppermost KAL sandstone ground waters can be grouped as upper HSU ground waters.

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VI.3-58 11 **Comment:** (E) KAR should be spelled out for just-time use (assume its Cretaceous Arapahoe Formation?)

Response: "KAR" was in error in original text - has been replaced by "KAL". "(undifferentiated cretaceous Arapahoe-Laramie formation)" has been inserted and reader is directed to section VI.3.3.2.2 for additional relevant discussion.

VI.3-64 11-12 **Comment:** (E) Suggest rewording for clarification to: ...to intercept groundwater flowing in surficial materials over a linear distance perpendicular to the flow path of approximately 1,750 feet. However, the system is only capable of desaturating groundwater flow in surficial materials over a liner distance of 1,400 feet.

Response: Paragraph has been rewritten to clarify as suggested and to better explain "keyed into bedrock".

VI.3.3.3 Effectiveness of ITS System

(First paragraph OK except for "the" as shown on original page)

Data currently available indicate that where the ITS is keyed into bedrock, it is effective in collecting ground water in the unconsolidated material of the upper HSU. Generally, effective bedrock "keying" is indicated where the base of an ITS trench is at an elevation equal to or below the top of the bedrock claystone. Where the ITS is keyed into bedrock, depths below the top of bedrock range from 0 to 19 feet with most locations being less than 5 feet. (The impact of weathering of the bedrock claystone surface on the effectiveness of bedrock "keying" is unknown.) Originally the ITS was designed and built to intercept upper HSU ground water over a linear distance, measured perpendicularly to the flow path, of approximately 1750 feet. However, the eastern 228 feet of the ITS are known to not be effectively keyed into bedrock and consequently only 1400 feet of the upper HSU flow is intercepted. Thus, the ITS can only be effective in desaturating the upper HSU over a maximum of 80 percent of its design area. Although the evaluation conducted is adequate to determine the effectiveness of major portions of the ITS, field data is insufficient to detect all problem areas (eg. those caused by crushed or clogged pipes etc.). Further observations regarding the ITS are identified below.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.3-64	22-26	Comment:	(S) This narrative would be easier to follow if accompanied by a labelled figure.
		Response:	A full suite of figures to accompany narrative is presented in Appendix A.
VI.3-65	4-6	Comment:	(S) Suggest discussing this in Part II in regard to soil contaminant results.
		Response:	This comment has been referred to persons responsible for Part II.
Figure VI.3.3-22		Comment:	(E) SW56 is not fully illustrated on the figure.
		Response:	"SWO56" has been moved onto the main body of the map and an arrow placed to indicate the actual position is off the map.
VI.3-66	1-5	Comment:	(E) This is indirect contract to the previous bulleted statement. It may be beneficial to illustrate the flow and collection of groundwater by the ITS.
		Response:	(It was assumed that comment should have read " in direct contrast to".) The two paragraphs have been rewritten to eliminate apparent contradiction.

p. VI.3-65 (last ¶) and VI.3-66 (first ¶)

- Significant areas of contaminated ground water flow in unconsolidated material of the upper HSU appear to be effectively intercepted by the ITS. These areas are north, down gradient and down slope of the SEPs where the ITS is keyed into bedrock.
- In other areas where nitrate contamination of ground water in unconsolidated material of the upper HSU exists, especially northeast of SEP 207-B North, the ITS fails to collect that contamination (EG&G, 1993a). In this area the ITS is generally constructed above the top of bedrock elevation and some portion of the total ground water flow may

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pass beneath the ITS. ITS upgrading may be required to accomplish complete interception in this area.

Figures contained in Appendix A illustrate the location of "effective" and "uneffective" ITS areas (Fig. VI.A-5) and Figure VI.2.1-2 shows the ITS system, ground water flow directions and a piezometric surface which reflects the problem with the eastern portion of the ITS where it is not keyed into bedrock.

VI.3-66 23-31 **Comment:** (S) Suggest discussing this in Part II in regard to soil contaminant results.

Response: This comment has been referred to persons responsible for Part II.

VI.3-66 33-43 **Comment:** (E) Only one sump is located on Figure VI.3.3-23 and the sump is not labeled.

Response: As stated in the legend of Fig. VI.3.3-23, this figure is intended to show seeps, not sumps as all sumps have been decommissioned (as stated in the text). The words "SUMP 2" appear on the figure only as part of the designation of the associated seep. Reader is referred to Phase I Work Plan for locations of all old seeps, trenches and etc..

VI.3-68 6 **Comment:** (E) Typo; change to...of the ITS and...

Response: Page VI.3-68 contains Table VI.3.3-3 w/o line numbers. Reference is not clear. Checked several adjacent pages - no such typo is apparent.

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VI.3-69 **Comment:** (E) Not all surface water stations are shown on Figure VI.3.3-22.

Response: All surface water sampling stations listed in Table VI.3.3-3 are shown on Fig. 3.3-22 but the converse was not true. Table VI3.3-3 has been up dated to include a description and listing of all surface water sampling stations shown on Fig. VI.3.3-22.

Figure VI.3.3-23 **Comment:** (E) The figure indicates that the footing drain for Building 779 empties into a seep north of Pond 207A. This should be discussed in Part II regarding it's potential impact to soil contamination as well as in Part VI.

Response: Surficial soil contamination on an OU4-wide basis is discussed in part II.3.4.2. Soil data from nearby sampling locations (40793 and SS403293) is presented in part II.3.2.2.

VI.3-71 **Comment:** (E) Typo: statidae?

Response: "statidae" replaced with "station"

VI.3-72 8 **Comment:** (S) Suggest referencing the appropriate section of Part II that discusses the findings summarized in this section of Part VI.

Response: The correction was made.

VI.3-72 33 **Comment:** (E) Principal contaminants should be identified.

Response: The text was changed to read "other contaminants."

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VI.3-73	1-7	Comment:	(E) The list of contaminants shown on the table does not have all the potential contaminants identified in the 1993 RCRA Annual Groundwater Monitoring Report (p. 3-1).
		Response:	The table addresses the major contaminants historically associated with the liquids contained in the different ponds. The 1993 Annual RCRA Groundwater Monitoring Report refers to potential contaminants in the ground water system which are not necessarily related to the solar ponds.
VI.3-74	3	Comment:	(S) Suggest mentioning that the soil data is relevant in determining potential impacts to groundwater through leaching, colloidal transport and/or other relevant mechanisms.
		Response:	The correction was made.
VI.3-74	10	Comment:	(S) Suggest referencing the source of the background information and/or how it was determined. It would be helpful to provide percentage in terms of number of samples analyzed (i.e. 50% of the x number of samples analyzed) in this section.
		Response:	The source of the data (RFEDS data base) has been noted in the text. Percentages were intended to simplify and summarize the data presented exhaustively in the Phase I RFI/RI Report. Footnotes have been added to provide the number of samples.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.3-74	19	Comment:	(E) Average and maximum for Beryllium need to be switched.
		Response:	The table has been updated and is now consistent with the Phase I RFI/RI Report.
VI.3-75	2-3	Comment:	(E) According to Table VI.3.4-1, Barium was not detected above background concentrations.
		Response:	The table has been updated and is now consistent with the Phase I RFI/RI Report.
VI.3-75	10	Comment:	(E) Change organics to organic.
		Response:	The correction was made.
VI.3-76	5	Comment:	(E) Suggest changing to ...a source of groundwater contamination... <u>or</u> ... (i) migrate into groundwater...
		Response:	The correction was made.
VI.3-76	8-10	Comment:	(E) Suggest changing to: ...and over the groundwater could either retard contaminant migration into the groundwater and/or act as source of groundwater contamination.
		Response:	The correction was made.
VI.3-77	23	Comment:	(E) Suggest spelling out the number 2 and changing the semicolon to a period.
		Response:	The correction was made.

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VI.3-77 30 **Comment:** (E) Break in line should be removed. Change to:
Based on 136 analyses, 1,1,1-trichloroethane... or
if line 30 is a footnote, it requires an * and the next
sentence should be changed that it is not started
with a number.

Response: An asterisk has been added to the footnote. The
following sentence has been reworded.

VI.3-79 5 **Comment:** (S) Suggest adding a footnote to Table VI.3.4-3
indicating the number of samples analyzed. Also
suggest changing Pesticide to -Pesticide to match
the format.

Response: The correction was made.

VI.3-79 45 **Comment:** (S) Suggest summarizing the relationships in data
between the surficial soils, borehole soils, and pore
water (i.e. vertical migration of contaminants) and
potential impact to groundwater.

Response: These relationships have been summarized in
Section 3.4.3.4.

VI.3-80 4 **Comment:** (S) Suggest checking the 1993 Annual Groundwater
Monitoring Report for any changes that may have
occurred since 1992.

Response: The 1992 and 1993 RCRA Annual Groundwater
Reports were compared. Although the data
provided in the two reports differ in the location
and number of available samples, the additional data
does not significantly change the understanding of
the OU4 hydrologic system. The additional data,

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therefore, has no impact on the Field Sampling Plan. The 1993 data are included primarily by referencing the 1993 RCRA Annual Groundwater Monitoring Report.

VI.3-80 22-24 **Comment:** (E) It is not clear what is meant in this sentence.

Response: The sentence was reworded.

VI.3-80 28 **Comment:** (N) The detected volatile in groundwater listed in this section do not agree fully with those listed on page 3-12 of the 1993 RCRA Annual Groundwater Monitoring Report.

Response: The sentence was reworded to include VOCs detected in both the 1992 and 1993 Groundwater Monitoring Reports.

VI.3-80 33 **Comment:** (E) The contours on Figure VI.3.4-1 do not agree with the text.

Response: The contour maps for VOCs have been replaced with maps showing the concentrations of detected analytes.

VI.3-80 35 **Comment:** (N) The contours on Figure VI.3.4-1 may be misleading if the potential source of VOCs is southwest of the ponds. The contours suggest that the source is Pond 207C. It is also important to note if any drains (especially the waste process drains) could lead to the areas with elevated VOCs.

Response: The contours have been replaced with maps showing the concentrations of detected analytes.

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The VOCs are not believed to be sourced from the SEPs because the levels of VOCs found in the soil column and vadose zone pore water do not indicate that VOCs have moved through the soil column. A potential upgradient source is Building 774 that contains several solvent tanks located below the water table.

VI.3-82 2 **Comment:** Well B208189 is not shown on Figure VI.3.4-1. Is the well described actually B208089?

Response: The text has been changed to reference well B208089.

VI.3-82 10 **Comment:** (N) The levels of detected U²³³ and U²³⁴ reported in the 1993 RCRA Groundwater Monitoring Report (Figure 3-12) are significantly different at some locations than depicted in Figure VI.3.4-2. The contours would change and possibly lend more insight to sources and migration pathways. Additionally, the 1993 groundwater report summarizes strontium, cesium, tritium, plutonium, gross α , gross β , and americium occurrences in more detail (see Figure 3-11) which would be useful in summarizing this data for the RFI/RI Phase II OU4 Work Plan.

Response: The 1993 Annual RCRA Groundwater Monitoring Report was not available during the preparation of the work plan. Comparison of 1992 and 1993 data, however, shows that the levels and extent of contamination present in OU4 do not vary significantly. In general, the areas and levels of contamination are similar in 1992 and 1993. It is important to note that the amount of data available for different contaminants in the 1992 and 1993

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Reports varies. (For example, there are notably fewer data points for tritium in the 1992 Report.) In the RCRA Groundwater Monitoring Reports, no values are posted for wells for which there is no data. The variations in the concentration and extent of contaminants in OU4 do not mandate any changes to the Field Sampling Plan.

All data were reviewed in the preparation of the work plan. Representative contaminants were presented in the work plan to provide a concise summary of existing data. Data for all potential contaminants will definitely be presented in the Phase II RFI/RI Report.

VI.3-82	35-37	Comment:	(S) Figure VI.3.4-3 and figure VI.3.4-5 show nitrate/nitrite and sulfate hot spots at Building 910. It would appear that there may be a relationship with the brine storage beds.
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		Response:	A brief discussion about the brine storage beds has been added to the narrative.
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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.3-82	41	Comment:	(E) Typo change to nitrate/nitrate.
		Response:	The correction was made.
Figure VI.3.4-2		Comment:	(E) Well P207489 is not shown on the figure but is referenced in the text (p. VI.3-82, line 18).
		Response:	The well has been replaced by well 05293 as part of the Well Assessment and Replacement Program. The text has been changed to state that well P207489 is in the same location as 05293.
VI.3-87	6	Comment:	(E) The elevation nitrate/nitrite concentrations at Well 3686 are not depicted on Figure VI.3.4-3.
		Response:	The text refers to elevated sulfate levels at well 3686.
VI.3-87	9	Comment:	(S) It would be helpful to provide an explanation of the significance of fluoride occurrences (i.e. Is fluoride a possible contaminant release from the ponds and if so it should be listed in Section VI.3.4.1. Does fluoride act as a path finder of contamination, etc.). Also, Figure VI.3.4-3 does not agree with Figure 3-20 in the RCRA groundwater report which addresses nitrates.
		Response:	The concentrations of fluoride in ground water were not presented in a proper frame of reference. Only one detection of fluoride exceeds the MCL. The Fluoride map, therefore was removed from the Work Plan.

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VI.3-87 15 **Comment:** (S) Lithium is not addressed but is discussed in the RCRA groundwater report (see Figure 3-24).

Response: The 1992 Annual RCRA Groundwater Monitoring Report does not contain any references to lithium as a contaminant. The 1993 RCRA Groundwater Monitoring Report was not available during the preparation of the Phase II RFI/RI work plan. The areas of unconsolidated materials and weathered bedrock containing elevated lithium concentrations are no different from areas in which other contaminants are present. Thus, no changes to the Field Sampling Plan are necessary.

VI.3-87 15 **Comment:** (E) The list of detected metals does not fully agree with those listed in the 1993 RCRA Annual Groundwater Monitoring Report (see Table 3-5).

Response: The 1993 RCRA Groundwater Monitoring Report was not available during the preparation of the Phase II RFI/RI work plan. The additional metals detected in the 1993 sampling program have been added to the text.

VI.3-87 25 **Comment:** (S) Correlation between the types of contaminants and their occurrences should be summarized in more detail.

Response: The data are not complete enough to accurately characterize the relationships between the different contaminants. Complete characterization of the nature and extent of contamination in OU4 is a primary goal of the Phase II RFI/RI.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.3-87	General	Comment:	(E) The 1993 Annual Groundwater Monitoring Report discusses additional inorganic parameters detected groundwater near the SEPs (see Table 3-5).
		Response:	The 1993 Groundwater Monitoring Report was not available during preparation of the Work Plan. The additional inorganic substances detected in the 1993 sampling program have been added to the text.
VI.3-90	4	Comment:	(N) Suggest discussing potential for DNAPL occurrences in the area.
		Response:	A discussion of the occurrence of DNAPL has been added to the text.
VI.3-90	19	Comment:	(N) Suggest that for the RFI/RI all potential contaminants be reviewed rather than limiting the review to "representative" contaminants. The geochemical properties of the various constituents varies thus, the fate and transport of the constituents varies. This applies to radionuclides, metals K, semivolatiles, and inorganics. Comparison of Figures 3-11, 3-13, 3-15, and 3-17 of the RCRA Annual Groundwater Monitoring Report with related figures in the RFI/RI work plan shows large differences in the data.
		Response:	All data were reviewed in the preparation of the work plan. Representative contaminants were presented in the work plan to provide a concise summary of existing data. Data for all potential contaminants will definitely be presented in the Phase II RFI/RI Report.
			The 1993 Annual RCRA Groundwater Monitoring Report was not available during the preparation of

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the work plan. Comparison of 1992 and 1993 data, however, shows that the levels and extent of contamination present in OU4 do not vary significantly. In general, the areas and levels of contamination are similar in 1992 and 1993. It is important to note that the amount of data available for different contaminants in the 1992 and 1993 Reports varies. (For example, there are notably fewer data points for tritium in the 1992 Report.) In the RCRA Groundwater Monitoring Reports, no values are posted for wells for which there is no data. The variations in the concentration and extent of contaminants in OU4 do not mandate any changes to the Field Sampling Plan.

VI.3-92	1-18	Comment:	(N) The summary should include a bullet regarding the elevated concentrations northeast and east of the ponds. Additionally, correlation between the types of contaminants and their occurrences should be summarized in more detail.
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Response:	A bullet was added to the summary as suggested. A summary of contaminant occurrences and the significance of the occurrences will be presented in the Phase II RFI/RI Report. The data currently available is not complete enough to accurately characterize the correlation between the different contaminants.
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VI.3-92	22-29	Comment:	(E) Please see comment regarding page VI.3-88 lines 1-10.
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Response:	There is no such comment.
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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.3-93	24-28	Comment:	(S) The fact that the VOC concentrations do not vary significantly with location or depth, in conjunction with the very low levels at which they were detected, is suggestive of possible false positives. This may be worth mentioning. In addition to acetone and methylene chloride, 2-butanone and carbon disulfide are sometimes lab contaminants.
		Response:	The author concurs with this statement, and the comment has been incorporated into the document.
VI.3-93	32	Comment:	(N) It is not clear how Pu ^{239/240} would be present in unweathered bedrock samples. It may be beneficial to state the Pu ^{239/240} background level separately and provide a explanation if necessary, of the level in bedrock.
		Response:	The section has been revised to more clearly state the author's point.
VI.3-94	28	Comment:	(E) Suggest changing monitoring to investigation.
		Response:	The correction was made.
VI.3-94	35	Comment:	(N) The Work Plan discusses the occurrence of VOCs in groundwater with a potential source as the SEPs. This is not consisted with the descriptions provided in Part II regarding source materials.
		Response:	The work plan was revised to be consistent with the Phase I RFI/RI Report.

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Page(s) # Line(s) # Geraghty & Miller Part VI

Figure VI.3.4-6 **Comment:** (E) Legend says mg/L, title says ug/L.

Response: The legend has been corrected to read ug/L.

VI.3-96 Figures
thru VI.3.4-8
VI.3-99 thru
VI.3.4-11

Comment: (E) Portions of these figures are illegible due to the size of the print.

Response: The figures were reproduced at a larger scale.

Figure VI.3.4-8

Comment: (E) The figure is not legible.

Response: The figure was reproduced at a larger scale.

VI.3-106 1-9

Comment: (N) The variance in radionuclide occurrence could be, in part, due to colloidal transport which needs to be addressed as a potential migration pathway.

Response: The text was revised to acknowledge this pathway.

VI.3-106 32

Comment: (E) EDE requires defining.

Response: The text was revised. (EDE = effective dose equivalent)

VI.3-107 35

Comment: (S) These two items seem more like contaminated media rather than sources. Aren't geologic materials the same as soils beneath the ponds? Lines 12-14 of this same page outline the topics of discussion for this section:

- Sources of contamination.
- Types of contamination.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
		<ul style="list-style-type: none"> • Affected media. • Contaminant migration pathways. • Environmental receptors. <p>These should be consistent with the titles of the subsequent sub-sections.</p>	
		Response:	The text was revised to incorporate these suggestions.
VI.3-107 and Figure VI.3.5-1		Comment:	(N) Vadose zone pore water may also be another source.
		Response:	The correction was made.
VI.3-111	23	Comment:	(S) Suggest changing EPA to IAG or EPA and CDH.
		Response:	The text was revised.
VI.2-112	1	Comment:	(E) Suggest changing definization to define contribution...; characterization to characterize groundwater; and delineation to delineate contaminants. For consistent format, add a line between lines 2 and 3.
		Response:	The corrections were made.
VI.3-112	3	Comment:	(N) DNAPL occurrence and colloidal transport should also be characterized.

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Response: Dnapi occurrence will be characterized using bailers specifically designed to sample for DNAPLs in wells that have historically contained higher levels of VOCs. The importance of colloidal transport will be characterized by performing specialized filtration tests at several locations in OU4. These tests have been proposed in the FSP.

VI.3-113

Comment: (E) Typo on footnote; EE should be defined; and typo under extent of contamination.

Response: The corrections were made. (EE = ecological evaluation)

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.4-1	33, 41,42	Comment:	(E) Typo change to design, add space before and.
		Response:	Change was made as requested.
VI.4-2	1	Comment:	(E) It is not clear who site stakeholders are.
		Response:	The site stakeholders have been listed in the text for clarification.
VI.4-2	7-11	Comment:	(S) Suggest adding site health and safety decisions on line 8. Lines 9 and 10 are not consistent with 4 and 5.
		Response:	"Health and safety" has been added to line 8. Line 5 has been modified to read "...personnel such as laboratory staff, report authors and records managers." to establish consistency between lines 4 and 5 and 9 and 10.
VI.4-2	26	Comment:	(S) Suggest adding characterization of surface water system, and air systems. (See also Section VI.5-1).
		Response:	Line 26 has been modified to read "1) Characterize the surface, alluvial and bedrock hydrologic systems and their interactions." Line 37 has been modified to read "3) Characterize contamination in OU4 surface and ground water systems."
			OU4 air quality data has been reviewed and a determination made that additional air sampling stations are not required. Existing air monitoring stations will continue to collect air samples and

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these data (and historical data) will be used to meet the Phase II objective of assessing the impact of OU4 contaminant releases on air quality. Because adequate air characterization data will be collected without additional Phase II field effort, collecting air quality data is not a Phase II data quality objective.

VI.4-3 20 **Comment:** (S) Suggest adding results associated with air and surface water.

Response: The sentence has been modified to read "The information generated in this effort will be used in the risk assessment to evaluate the potential risks associated with the ground water, surface water and air dispersion."

VI.4-4 8-11 **Comment:** (S) What about risk assessment and Bowman's Pond?

Response: The sentence has been rewritten to read "As delineated in Section 4.1.3, the objectives of the OU4 Phase II RFI/RI include characterization of the surface and ground water systems, delineation of upgradient sources, contaminant characterization, delineation of extent of contamination, evaluation of mobility traits, ITS effectiveness evaluation, regulatory compliance (risk assessment) and evaluation of Bowman's Pond water system."

VI.4-4 21 **Comment:** (E) The RCRA reports are specific to the SEPs which are OU4.

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Response: Line 21/22 "However, the RCRA reports...are site wide programs." has been deleted to clarify this paragraph.

VI.4-4 29 **Comment:** (E) The impact of Bowman's Pond also cannot adequately be addressed with the existing data.

Response: The sentence "In addition, the impact of Bowman's Pond cannot adequately be addressed with the existing data." has been added to the last paragraph in section 4.2.2

VI.4-6 37 **Comment:** (E) Unnecessary blank line.

Response: The blank line has been deleted.

VI.4-7 41 **Comment:** (E) Check spelling: focussed.

Response: Webster's New Collegiate Dictionary lists both "focused" and "focussed" as correct spellings.

Table 4.4-1 **Comment:** (N) Semivolatiles and inorganic (metal) occurrences also need evaluating.

Response: Semivolatiles are not included because of the very low rates at which they were detected in ground water at Rocky Flats. According to the 1993 RCRA ground water report (p. 1-5 and Table 1-3) semivolatiles in ground water have not been analyzed since 1991. Metals are listed as a data need for objectives 1, 2, 3, 4, 5 and 7 in Table 4.4-1.

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VI.4-9 **Comment:** (E) Typo last line under field or sampling/analysis activity: change dissolved O₂, to dissolved O₂

Response: O₂ has been changed to O₂

VI.5-1 23 **Comment:** (S) Suggest adding characterization of surface water and air system in order to meet requirements of IAG and CERCLA by fully developing a conceptual model.

Response: The surface water has been added. Air was listed as a requirement, but not in the specific objectives of the FSP because additional air monitoring is not proposed.

VI.5-1 27 **Comment:** (N) Recommend reviewing design documents of the waste process lines, nearby building drains, and other relevant information to help determine the presence of potential sources that could be contributing to OU4 groundwater contamination.

Response: All available information, both historic and current, pertinent to drains, waste lines, etc. was reviewed in development of this work plan.

Table VI.5.2.1 **Comment:** (S) Suggest adding a notation under Bedrock Groundwater column where blank to explain why it's blank (i.e. place -- in column and explanation in footnote). It is not clear what the meaning of last two sentences in the footnote is. It would be clearer if a row for inorganics was added so that the nitrate/nitrite information could be put in the table

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rather than the footnote (i.e. Inorganics metals, anions-nitrate/nitrite).

Also, the results of pore water and surface water should be added to the table. The footnote should include an explanation of others listed under SVOCs.

Response: The columns are blank where the data was unavailable. The "others" column has been deleted. Pore water and surface water were not deemed pertinent to this table.

VI.5-2 44 **Comment:** (E) The text states that there were very few detections of pesticide. However, the table indicates that no pesticides were detected.

Response: The text states few detections of pesticides and PCBs. There were two detections of PCBs and no detections of pesticides.

VI.5-4 10 **Comment:** (S) It is possible that the low detections of VOCs in soil could be related to volatilization of VOCs in groundwater. The VOC data in soils should be evaluated against groundwater data to determine if a possible relationship exists between their occurrences.

Response: This suggestion will be pursued in the Phase II RI report, once sufficient ground water data has been acquired.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.5-4	12-20	Comment:	(S) Please spell out rads in Table. Laboratory methods determine detection limits. The data for surface soil and borehole soil are best comparable if the same methods and detection limits were used. Additionally, the sample locations and number of samples collected under each group vary thus restricting direct comparison of data sets. A decrease in occurrence of radionuclides, SVOCs and Pesticides/PCBs with depth is an important observation and could be better supported with a statistical analysis and/or close review of the soil result figures in Part II. Metals and other inorganics should be added to the table and reviewed in the same manner.
		Response:	Radionuclides has been spelled out. The recommendations made are an effort that is more appropriately presented in the Phase I RI report. The intent of this table was a general summary of Phase I data to guide development of the work plan.
VI.5-5	4-14	Comment:	(S) Rads should be spelled out. Metals need to be added to the table. As with the previous comment, the results of the two data sets (alluvial and bedrock groundwater) may not be directly comparable.
		Response:	Radionuclides has been spelled out. It is understood that the data sets may not be directly comparable. This is a generalized table.
VI.5-5	11	Comment:	(S) Earlier text (Sec. VI.3) makes no mention of tetrachloroethane in groundwater. The predominant VOCs in alluvial groundwater are DCA, DCE,

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TCE, TCA, PCE, chloroform, carbon tet., and vinyl chloride; in bedrock groundwater they are the same except for the absence of TCA and vinyl chloride. Is this a typo? Also, are we talking about weathered bedrock?

Response: The correction has been made.

VI.5-5 23 **Comment:** (N) Further investigation is necessary to conclude if the subsurface soils have not been impacted by VOCs (i.e. via volatilization of VOCs in groundwater).

Response: The Phase I RI collected subsurface soils data. That data shows little impact by VOCs.

VI.5-6 4 **Comment:** (N) The basis for the statement is not clear. Contaminants in surface soils can be mobilized by surface water and can infiltrate the underlying soils and impact groundwater.

Response: The sentence has been reworded for clarification.

VI.5-6 11 **Comment:** (N) Inorganics (metals and anions) should be included.

Response: The discussion was on organics, which is why the inorganics were not mentioned.

VI.5-6 17-18 **Comment:** (S) TCE (specific gravity = 1.46) will sink if in its non-aqueous phase. However, at its solubility limit (1470 mg/L) a solution of TCE in water would have a specific gravity of approximately 1.0007.

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Response: Comment acknowledged.

VI.5-6 20-29 **Comment:** (S) Although the unsaturated zone soils may not be the source of groundwater contamination. The groundwater contamination may be impacting the unsaturated zones through evaporation. Additionally, VOC contaminants in the alluvial aquifer may impact the deeper aquifer via migration along fractures or vertical migration. It is important to evaluate the possibility of DNAPL occurrences and their potential historical and/or current sources.

Response: DNAPL occurrence has been discussed in Section 3.0 and recommended follow up investigations have been added to the FSP.

VI.5-6 22 **Comment:** (N) The reported VOCs concentrations in the bedrock aquifer are much higher in some locations than the alluvial aquifer. Compare Figures VI.3.4-6 and VI.3.4-1. The area north of Building 779 appears to potentially have DNAPL occurrences. It is suggested that a well be placed in the area immediately north of Building 779 to further investigate the DNAPL occurrence.

Response: DNAPL occurrence investigation has been discussed in Section 3.0 and the FSP.

Comment: (S) Suggest sampling bedrock wells P218489.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
		Response:	Further bedrock sampling has been proposed in the FSP. The rationale for this particular location has not been provided.
VI.5-6	39	Comment:	(S) Just a reminder to complete reference to Section 2 in the footnote and the footnote references in Table VI.5.2-2.
		Response:	Thanks for the reminder.
Table VI.5.2-3		Comment:	(N) For completeness other radionuclides (including gross α and β) should be added to the table.
		Response:	The title of this table is "selected". It was not intended to be comprehensive. It is a representation of the wide variabilities between the methods and the regulatory standards. In the case of radionuclides, the Pu presented is a good example, as the standards are most stringent.
VI.5-9	39-40	Comment:	(E) The analytical methods should be better defined (i.e. WQPL). The table (VI.5.2-3) should identify HQ and WQPL.
		Response:	The analytical methods table has been revised to be more comprehensive.
VI.5-11	1	Comment:	(E) Incomplete sentence.
		Response:	The correction has been made.
VI.5-11	4-8	Comment:	(N) It is not clear which analytical method would be most appropriate for analysis of lead.

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Response: The analytical methods table has been revised to clearly show each analyte and its associated method.

Table VI.5.2-3
and VI.5-11 34

Comment: (E) It is not clear what the B indicates when added to SW846, Method 8240B.

Response: The table and text have been revised.

VI.5-12 4

Comment: (E) It is not clear if WQPL Table 44 contains nitrates/nitrites which is an appropriate parameter for evaluation.

Response: The analytical methods table has been revised to clarify. Nitrates/nitrites will be evaluated.

VI.5-12 22

Comment: (N) Pertinent chemical and major ion analyses required to meet the data needs identified in Table VI.4.4-1. Objectives 1, 2, 5, and 6 are also necessary.

Response: This analytes were included in the "water quality" reference. The table has been revised for clarification.

VI.5-12 38

Comment: (S) It is also important to investigate the possibility and characteristics of DNAPL occurrences.

Response: Discussion on the likelihood and characteristics of DNAPL occurrence has been included in Section 3.0.

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VI.5-13 19 **Comment:** (S) The air quality analyses presented was too brief to fully disregard additional analytical information at this time.

Response: There was no intent to disregard further analytical information.

VI.5-14 and 24
VI.5-25 1

Comment: (S) The location of some wells should be based on an evaluation of the potential occurrence and location of DNAPLs in the area of OU4. The wells should be located and constructed to characterize the geology and hydrology as needed per objectives 1 and 5 in Table VI.4.4-1. Thus, the objectives of the aquifer tests should also be considered.

Response: Weathered bedrock wells W-16, W-15 and W-5 are intended, in part, to evaluate the possibility of DNAPLs around 207C Pond, where VOCs historically have been detected. Well W-15 will be screened in bedrock sandstone and well W-16 will be screened in weathered claystone bedrock. I'm not sure I understand the last sentence of the comment. Proposed aquifer test "C" is located near 207-C pond, in the area where VOCs historically been detected.

Table VI.5.3-2

Comment: (S) Proposed wells A2, A3, and W3 are not upgradient of the entire SEP system.

Response: Listing proposed alluvial well A-3 as an upgradient well was a typographical error which has been corrected. Wells A-2 and W-3 are upgradient of 207-A pond. Locations "upgradient of the entire

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SEP system" are within the 700 building industrial complex and would probably intercept contamination from one of the numerous Individual Hazardous Substance Sites (IHSSs) located in that area.

Figures
VI.5.3-1
VI.5.3-2

Comment: (S) The number of alluvial and bedrock wells to the southwest of Ponds 207-A and 207-C seems insufficient for objective 2; delineation of contribution to OU4 from upgradient sources.

Response: Potential borehole locations southwest of Ponds 207-A and 207-C are limited due the high density of buildings and overhead and underground utilities in that area. We feel the proposed alluvial and weathered bedrock locations are sufficient to meet the objectives, given the physical limitations of the surrounding area.

VI.5-29 26 **Comment:** (E) Subheading numbers VI.5.3.3 and VI.5.3.4 are missing.

Response: The subheading numbers have been listed correctly.

VI.5-34 1 **Comment:** (S) The geophysical investigation can also be beneficial in locating unknown buried conduits that could be acting as a source of groundwater contamination from sources other than the SEPs.

Response: The Phase I investigation into sources and soils focussed on this. All data gained from that investigation will be utilized for the ground water investigation.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.5-40	1	Comment:	(E) Missing words in sentence.
		Response:	The sentence has been edited to take care of omissions.
VI.5-40	36	Comment:	(S) Sites drilled with the sonic drill rig should be identified ahead of field activity implementation to assure that the necessary hydrogeologic data is obtained since cuttings and hence a geologic log will not be generated.
		Response:	The plan is to use the resonant-sonic drill rig in all locations accessible to that rig. Detailed accessibility issues have not yet been resolved but will be prior to field work. While it is true that this method produces virtually no cuttings it does allow for collection of a complete (typically), undisturbed (typically) core for the entire drill depth. It is anticipated that all lithologic logging, and all geotechnical/geochemical analyses will be performed on this core. Field lithologic logging will probably be complemented by a more detailed logging after drilling is completed.
VI.5-41	27	Comment:	(S) Suggest conducting geotechnical sampling and analyses on a bedrock sample collected from the siltstone north of the ponds.
		Response:	The geotechnical sample from well W-16 will sample bedrock sandstone from north of 207-C pond.
VI.5-42	5	Comment:	(E) Add blank line between paragraphs.

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Response: Change was made as requested.

VI.5-42 33, 34,
40, 44

Comment: (E) The SOP cited is not listed in Section VI.9.

Response: Change was made as requested.

VI.5-42 38

Comment: (S) It is not clear if water collected in the buried stainless steel bowl will be open to the atmosphere until sampling. Under such conditions, the water could equilibrate with the atmosphere and not provide a representative sample for analysis.

Response: As described in SOP SW-03 (Section 5.3.5) and in the context of VI.5-42 lines 37-41, the intent is to sample seeps with very low flow occurring where subsurface water issues at the surface. The purpose of the SS bowl is simply to allow a deep enough spot from which to conveniently obtain the sample. In-as-much as the seep water is already exposed to the atmosphere before it gets to the bowl, the water in the bowl should be representative of the seep water. Although not specified in SOP SW-03, the opening of the bowl should only be as large as necessary to allow the introduction of the sampling device. In this way there will not be enhanced exchange with the atmosphere due to large surface areas.

Whether or not the sample collected in this way is representative of the subsurface water is another matter. We would expect the possibility of altered total inorganic carbon (but not alkalinity) concentrations, pH, VOC concentrations, and

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tritium. Another sampling scheme would be required to preclude these problems.

VI.5-44 and 45

Comment: (S) Suggest showing water level on Figures VI.5.4-2 and 3 to show the relative position of well screen and other features to water level.

Response: Both figures have been amended to include the observed (projected) maximum water table elevation. It is the intention to screen the entire saturated and potentially (seasonally) saturated alluvium zone. Accordingly the elevation of the top of the screen will approximately equal to the elevation of the maximum water table elevation unless this compromises the requirements for surface grouting/cementing.

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Table VI.5.5-1

Comment: (E) For footnote d; it is not clear if ascorbic acid and/or sodium hydroxide should be added to the cyanide samples. Also, it is not clear what is meant by low to medium concentration samples (i.e. what are the criteria?).

Response: Footnote d has been amended to clarify use of ascorbic acid and sodium hydroxide.

VI.5-51 21

Comment: (N) If disposal of IDM into the ponds is consistent with or allowed for in the IM/IRA, the appropriate section of the IM/IRA should be referenced.

Response: Section IV.1.1 (page 4) of the IM/IRA decision document allows for disposal of OU4-related investigative derived material (IDM) beneath the engineered cover. This information has been added to the text.

VI.5-52

Comment: (S) The section regarding sampling rationale should include the same subsections as for the Analytical Rationale section and be directed toward the site physical features, (i.e. contaminant sources other than the SEPs (building footing drains, other groundwater plumes); geologic characteristics; and hydrologic characteristics, etc.

Response: We feel the proposed sampling plan addresses the relevant ground water sources and media found in OU4. The comment is rather general and we hesitate to reorganize the work plan without more specific comments.

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Page(s) #	Line(s) #	Geraghty & Miller	Part VI
VI.5-52		Comment:	(E) Need to add GPR and bedrock well subsections.
		Response:	A ground penetrating radar (GPR) discussion is included in section 5.3.4.2 and a new bedrock well discussion is included in section 5.3.1.3.
VI.5-52		Comment:	(S) Strongly suggest adding a section discussing impact from non-OU4 sources and potential DNAPL occurrence.
		Response:	A section discussing DNAPL occurrence has been added to section 3.5. In addition, Table 5.3-2 lists several wells (W-15 and W16) which are designed to, in part, evaluate DNAPL occurrence.
VI.6-1		Comment:	(N) Typo change to staging. Strongly recommend scheduling review time to evaluate potential impact of other sources to OU4 groundwater.
		Response:	This schedule has been redone.

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Page # **Line #** **Commentor:** Ainscough, CDH **Part:** VI 692-3337
692-3337

VI.1-1 21 **Comment:** (N) Add the word "comprehensive" preceding "baseline risk assessment..." as specified on Page 15 of the IAG Statement of Work.

Response: The change has been incorporated.

VI.1-4 7-11 **Comment:** (N) DOE may not assume that its investigation of soils has been completed under the Phase I RFI/RI. To the extent that releases to surface soils beyond the OU-4 boundary can be attributed to the operations of the SEPs and have not been addressed under the OU-6 RFI/RI (or other OU), DOE must delineate (or pursue) the airborne or waterborne plume until contaminant levels drop below PRGs for surface soils. Where data support the potential for soils contamination to exist beyond or down gradient of the SEPs, DOE must plan to conduct additional surficial soil sampling as part of this Phase II investigation. DOE may however, as part of the Phase I closure action, pursue the contaminants for the purpose of including that material in the proposed Phase I IM/IRA action under a hot spot removal and verification option and, thereby, eliminate the need for soil investigation under this workplan.

Response: The latter recommendation has been incorporated.

VI.2-4 42 **Comment:** (E) Currently, the flow from Walnut Creek is diverted around Great Western Reservoir by the Broomfield Diversion Ditch.

Response: The revision has been incorporated.

Figures VI.3.4-8
thru VI.3.4-11 **Comment:** (N) These figures are not legible and need to be improved.

Response: The figures have been revised.

VI.3-29	27	Comment: (E)	To the Division's knowledge, B910 still has not been used to treat water from the surge tanks. Instead B374 is used. Please verify the information on line 27 or modify it's content.
		Response:	Reference to Building 910 has been removed and replaced with Building 374.
VI.3-29	32	Comment: (E)	The Division does not agree that the absence of blue dye in the wells is evidence that the B-ponds did not leak. Either qualify the statement or remove it. Based on soil samples from beneath the ponds, it is difficult to make a case for no leakage.
		Response:	The sentence was qualified with "currently". the statement only refers to the results of the blue dye test, not to conditions prior to the test.
VI.3-33	28	Comment: (N)	This is an appropriate point to note secondary or macropore conductivity. Although the conductivity range is low, it is known that water moves through the RAF quickly.
		Response:	This paragraph was re-written to include a discussion of macropore flow.
VI.3-43	12	Comment: (E)	This sentence does not appear to be correct, i.e bedrock to bedrock contact.
		Response:	The sentence was corrected.
VI.3-64	31	Comment: (E)	If this is Bowman's Pond, so state.
		Response:	The reference is indeed to Bowman's Pond and the text has been amended to reflect this fact.
VI.3-74	18	Comment: (N)	Either the maximum value or background value for Barium is incorrect. Are they switched?
		Response:	The table was corrected.
VI.3-74	19	Comment: (N)	The Beryllium maximum value is incorrect. It is shown to be less than either the average or background value.

	Response:	The table was corrected.
VI.3-110 26	Comment: (N)	"Capping the ponds, as now designed, will minimize if not entirely eliminate infiltration and percolation through the ponds" may be a better way of stating this sentence.
	Response:	The sentence was reworded.
VI.5-9 44	Comment: (N)	This line does not conclude in a complete sentence on page VI.5-11 and the full meaning of the statement is unclear.
	Response:	The sentence was reworded.
VI.5-12 1	Comment: (N)	See the comment to page VI.1-4, lines 7-11.
	Response:	DOE is pursuing the soils as part of the closure action.
VI.5-14 17	Comment: (N)	Reference Figure 5.3-1 which shows the locations of the existing wells to be used.
	Response:	References to Figures 5.3-1 and 5.3-2 have been added to the text.
Table VI.5.3-2	Comment: (E)	In the Objectives column for Well W-12, it appears reference should be to South Walnut Creek rather than North Walnut Creek.
	Response:	This change has been made.
VI.5-29 18	Comment: (N)	What is the sampling depth for the proposed sample? Please reference a location in the document where this is discussed.
	Response:	Section VI.5.4.2 states that sediment sampling procedures outlined in Standard Operating Procedure (SOP) SW.06 (Sediment Sampling) will be followed. This SOP indicates that samples should be collected from the top 2 inches of the sediment column. A reference to this SOP has been added to the text in Section 5.
Fig. VI.5.3-5	Comment: (E)	Please clean up the map so well IDs are not atop one another as in the case of the wells to be

monitored in conjunction with the pump testing of Location D.

Response:

This problem is a shortcoming of the software used. The maps have been cleaned up manually as much as possible. Additionally, the software manufacturer is trouble-shooting the problem.

VI.5-40 27

Comment: (N)

Somewhere in Section 3 of this Work Plan information is provided which suggests that contamination has not impacted the unweathered bedrock. Are data sufficient from the Phase I program to fully document this conclusion throughout the OU? If not, it will be necessary to set casing at the weathered/unweathered bedrock contact, to avoid further contamination, and obtain core samples for analysis. The vertical extent of bedrock weathering, based on visual observation, most likely preceded the release of contaminants from the ponds. Therefore, the FSP must determine whether contaminants have been able to utilize the weathered bedrock as a pathway to the unweathered bedrock and contaminate it despite a lack of visual indications of weathering or contamination. The potential impact to bedrock sandstones underlying the RAF is apparent while impacts to claystone may be minimal; however, the impacts to siltstones may require further consideration. The Division welcomes a discussion of this issue to either set an additional course of action or to verify that the current knowledge of the unweathered bedrock is defensible.

Response:

In order to investigate potential contamination in the (deep) unweathered bedrock, a comparison of observed ground water contaminant concentrations to site-wide background ground water from the same geologic unit was made. This comparison was not presented in the initial draft of the Phase II Work Plan. Specifically, the highest concentrations of metals and radionuclides observed during 1992 and 1993 in nine unweathered-bedrock monitoring-well ground waters was compared to the 99/99 UTL values (the comparison criteria) provided in the 1993 Background Geochemical Report (this is equivalent to the Gilbert Method "hot test"). If the

observed values were greater than the comparison criteria (a "hit") the ground water was considered "contaminated", i.e., statistically outside the background population range. Employing this method, indications of contamination were found (see Tables VI.3.4-7,8).

Examination of the data in Tables VI.3.4-7,8 does not, however, provide an unequivocal indication of true "contamination" for the following reasons: (a) the "hits" typically represent very anomalous concentrations for any given monitoring and as such may represent erroneous values even though they were "validated"; (b) the number of metal "hits" was far greater than that for radionuclides and those monitoring wells most "contaminated" with metals were not necessarily "contaminated" with radionuclides (i.e., the overall pattern was inconsistent); (c) nitrate, a conspicuous component of pond water, was not elevated in any unweathered bedrock ground water; (d) monitoring wells located immediately down gradient of the ponds, where contaminant levels might be expected to be highest, were not necessarily the most "contaminated"; (e) monitoring wells located immediately down gradient of the ponds contain ground water very similar (in terms of major ion chemistry) to site-wide background ground water in the unweathered bedrock while all other unweathered bedrock wells in OU4 show deviations from background (higher TDS and Ca/Mg contents); (f) all unweathered bedrock monitoring wells were installed in 1986 or 1987 and may have suspect construction.

Given the above reasons we currently regard the unweathered-bedrock ground-water contaminant chemistry as questionable but consider them of sufficient concern to investigate further. Our proposed investigation objectives will be to (a) determine the reliability of the existing data by completing two new wells close to existing unweathered bedrock wells and (b) to better determine the extent/source of the elevated TDS ground waters in the unweathered bedrock by installing another two new monitoring wells.

VI.5-42 40 **Comment:** (N) Briefly describe the sample intervals and total depth of sampling for the Bowman's Pond sediment sample.

Response: A single grab sample of the top two to three centimeters of pond sediment will be collected from the center of Bowman's Pond using an Eckman Grab sampler. This text has been added to page 5-42.

Fig. VI.6.0-1 **Comment:** (N) Since the results of the investigation will culminate in the Phase II RFI/RI Report, please show the detailed steps and dates that will support the delivery of the draft report on April 16, 1996. This should include the report preparation times and any internal reviews by DOE/EG&G prior to delivery to the regulatory agencies.

Response: An expanded schedule has been included.

VI.9-1 NA **Comment:** (N) The list of SOPs should include those for surface water and sediment collection applicable to Bowman's Pond and the seeps.

Response: The SOPs list has been expanded to be comprehensive.

**COMMENTS AND RESPONSES
TO THE OU4 IM/IRA
ENVIRONMENTAL ASSESSMENT DECISION DOCUMENT**

Page # Line # Commenter: E.T. Pottorff, CDH **Part:** VI
692-3586

Figures VI.2.1-1
to 1-8.

Comment: It seems like a waste to include duplicate figures within the same document.

Response: The figures vary slightly in information depicted.

VI.3-31 5-15

Comment: What does "typical" mean?

Response: "Typical" has been changed to "Average"

VI.3-31 32

Comment: $3.8E-8$ is low for the geometric mean of bedrock sandstone. What values were used to calculate this mean?

Response: The values are from laboratory measurements on vertically oriented core samples. The low geometric mean is attributed to the vertical orientation of the test.

VI.3-33 36-39

Comment: It is not clear whether the range of ground water flow velocities being calculated is bedrock only or alluvial and bedrock.

Response: This was a typographical error. Velocities are for the unconsolidated materials portion of the upper HSU.

VI.3-34 all

Comment: Summarizing hydraulic conductivity values from previous documents perpetuates any errors and biases contained in those documents. One, recent, approved document that contains a statistical summary of all aquifer test data is a sufficient reference. It should be made clear that these values are sitewide and not local to OU4.

Response: Hydraulic conductivity values for the Rocky Flats are currently undergoing a data validation process. The process is not yet complete (Lovseth, 1994). The values presented here should be used with caution. The word "sitewide" was added to Table VI.3.3-1.

VI.3-36 1

Comment: What is "unconsolidated ground water"?

Response: This has been modified to "unconsolidated materials ground water."

Figure VI.3.3-1

Comment: The potentiometric surface maps need to take site wide information into account even if that information is not shown. These interpretations should then be used in contouring contaminant plumes.

Response: Sitewide information was utilized to develop the potentiometric surface maps.

Figure VI.3.3-3

Comment: This appears to be a later version of the top of bedrock map, the contours have been smoothed. The data that went into the map should be documented and control points posted. The map needs to be expanded up-gradient to give information about inflow to the area and down-gradient to the furthestest plume extent.

Response: This map appears in the Phse I RFI/RI report. Data used to generate the map consist of bedrock elevations from borehole drill cores and bedrock elevations from seismic refraction lines. These bedrock elevations were then hand contoured and digitized into a database. The digitized surface was then compared to 1951 and 1986 topographic contour surfaces and corrections were made where necessary. For example, in areas where bedrock is exposed at the surface it was sometimes necessary to adjust the bedrock contours where they cross present day stream valleys. The final bedrock contours were computer generated.

Location of data points (boreholes and Phase I seismic refraction lines) were added to this figure. Attempts were made to post location numbers and elevation values but, the map became too crowded and was unreadable.

The map has been expanded upgradient slightly, however, data points to the west of OU4 in the 700 industrial area are quite limited. The map has also been expanded to the south to include part of the South Walnut Creek drainage. Delineating the extent of ground water contamination is an objective of the Phase II Work Plan and maps showing these data (including bedrock contours) will be included in the Phase II report.

Figure VI.3.3-4	Comment:	These maps give no important & 3-5 information and they are incompletely documented.
	Response:	The maps have been edited for clarity. The maps are important because they show potential ground water flow pathways away from the Solar Ponds area towards North Walnut Creek.
Figure VI.3.3-6	Comment:	Would it be more correct to call this well an upper HSU well rather than alluvial?
	Response:	"Alluvial" has been changed to "upper HSU."
VI.3-43 25-27	Comment:	See comment on Table VI.3.3-1.
	Response:	Please refer to response for that comment.
Figures VI.3.3-8 & 3.3-9	Comment:	See comment on figure VI.3.3-1.
	Response:	Please refer to response for that comment.
Figures VI.3.3-17 thru 3-21	Comment:	Labeling is frequently difficult to distinguish in these diagrams.
	Response:	We agree and apologize. Unfortunately, the software is the only software available for this application and is not particularly well suited for display purposes. Every effort has been made, short of hand drafting, to clarify the figures. The author of the software has been contacted and appropriate modifications are being considered.
VI.3-77 13	Comment:	Why are no maps of the surface soil sampling area included?
	Response:	The work plan presents only a summary of the soils investigation. For more detailed information the reader should refer to the Phase I RFI/RI Report.
Figure VI.3.4-1	Comment:	These contours seem to have no relationship to the direction of alluvial ground water flow. It would be better to present data in tables labeling points until more is known about the flow system.

		Response:	The figures have been regenerated showing all VOC detections, and the contours have been removed.
Figure VI.3.4-2		Comment:	Multiple sources should be considered. Contouring seems more in accord with ground water flow map presented but it would still be better to present raw data.
		Response:	The figures have been regenerated showing all VOC detections, ("raw data") and the contours have been removed.
VI.3-88 24-		Comment:	This information suggests a nearby DNAPL source. The source and it's extent should be identified so that the impact on OU4 closure can be evaluated.
		Response:	An assessment of the occurrence of DNAPLs has been added to the text. Field activities (investigation) to definitize if DNAPL occurs a the site are proposed in the FSP.
VI.4-2 26-29		Comment:	Long term changes in the hydrologic systems, particularly increases, need to be evaluated as well.
		Response:	Characterizing alluvial and bedrock hydrologic systems will include analyzing hydrographs for long and short term changes.
VI.5-6 20-30		Comment:	The bedrock system appears to be more severely impacted. Soil survey needs to be done in the industrial area.
		Response:	A soil survey was conducted historically, and proved inconclusive.
Table VI.5.2-2		Comment:	The formula and parameters used to calculate the saturated zone Rd should be presented in the text. Are these calculations site specific?
		Response:	These calculations are site specific, and were derived from Phase I data on physical properties. This data is presented in Tables 3.2-1,2 of this report.
Table VI.5.3-2		Comment:	According to alluvial water table map presented proposed well A-3 is not upgradient of any pond, however a data gap does exist there.

Response: The potentiometric surface maps suggest that the proposed location for well A-3 may be downgradient of Ponds 207-A and 207-B South. Whether this is actually true depends on the precise location of the east-west trending groundwater divide shown on the maps. Therefore, the word "upgradient" in the referenced text has been replaced with the words "potentially downgradient".

**COMMENTS AND RESPONSES
TO THE OU4 IM/IRA
ENVIRONMENTAL ASSESSMENT DECISION DOCUMENT**

Page #	Line #	Commentor: S.M. Paris	Part: I II III IV V <u>VI</u>
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General **Comment:** E Groundwater should be presented as one word when used as a noun and hyphenated (ground-water) when used as an adjective.

Response: As per accepted usage in a majority (but not all) of published works and periodicals the following usage has been adopted throughout this text: "ground water" is used as noun and "ground-water" as an adjective.

Comment: N Please include the definition of the Upper and Lower HSUs in this section. The Final Groundwater Protection and Monitoring Program Plan (1991) references the UHSU and states the upper hydrostratigraphic unit comprises several distinct lithostratigraphic units: Quaternary alluvium, colluvium, valley-fill alluvium, landslide deposits, weathered bedrock of the Arapahoe/Laramie Formation, and all sandstones within the Arapahoe and Laramie Formations that are in connection with overlying unconsolidated deposits or the ground surface. The 1993 Draft Final Well Evaluation Report (1993) states the lower hydrostratigraphic unit is composed mainly of unweathered bedrock of the Laramie Formation and includes unweathered portions of the Arapahoe Formation.

Response: An attempt has been made to consolidate all previous document relevant to this topic and to reconcile them with current knowledge and conceptual models. A new figure, Figure 2.1-1, "OU4 Hydrostratigraphic Column", has been added to the text to clearly illustrate our usage of the various terms. It was our objective to eliminate ambiguity and to conform to best available knowledge.

2-1 32 **Comment:** N "Alluvial materials" Either change alluvial materials to UHSU or define "alluvial materials". Groundwater at RFP is typically classified as either alluvial or bedrock with no distinction made between those screened in the upper or lower HSUs. This classification scheme is useful when describing detailed variations in groundwater chemistry but not as useful for discussions of groundwater flow. Groundwater in the upper HSU may be present in colluvial materials. Please reference alluvial materials which

contain colluvial materials as unconsolidated materials and define term usage in the report.

Response: The text has been revised to "unconsolidated materials".

Comment: N "surficial materials" define as unconsolidated materials.

Response: I assume this is a general comment. The term "surficial materials" has been changed to "unconsolidated materials" through out the document.

3-1 17 **Comment:** S add the name of the report Geology and Ground Water of the Rocky Flats Plant after "pond". I assume the cores were taken prior to this investigation.

Response: The report name has been added to the text.

3-1 17-22 **Comment:** N "Much of the groundwater information" included in Mudge and Brown was obtained from Austin? The correlation between Mudge and Brown and Austin is not clear. "Both of these documents" ?

Response: This section has been rewritten for clarity.

Comment: N Include Pond 2A following solar pond and delete " and was sealed". Pond 2A leaked and therefore was not sealed.

Response: Changes were made as requested.

3-1 27 **Comment:** N Again, reference Pond 2A after "clay-lined pond".

Response: Changes were made as requested.

3-1 31 **Comment:** N reword to read; An increase in both..... were observed during monitoring of the spring.

Response: Changes were made as requested.

3-1 32 **Comment:** N Discuss construction of Pond 2-Auxiliary (1956) and Pond 2D (1959) which were constructed previously of B-series ponds.

Response: The text has been modified to reflect this comment.

3-1 34 **Comment:** S Reference six monitoring wells 0160 through 0660. Give brief overview of the analytical results. State wells were abandoned

during WARP 1992 activities.

Response: Additional text has been added to this section, including a summary of analytical data.

3-1 38 **Comment:** N Figure I.2.3 of the IM/IRA document states drain tiles were installed in 1959.

Response: "1960" was changed to "1959" on page VI.3-1 line 38.

3-23 1 **Comment:** S Present an overview of the results of surface water sampled at drain tiles.

Response: A brief summary of these results, as identified in the monthly Process Waste History/Progress Reports, have been incorporated into the text. The 1988 RCRA Solar Ponds Closure Plan has also been referenced.

3-23 6 **Comment:** N What media did the RFP Site Survey Group periodically monitor?

Response: The following sentence was added, "The RFP Site Survey Group periodically monitored soils, vegetation and various structures and, occasionally, vehicles."

3-23 14 **Comment:** N "deep wells" How deep? What formation?

Response: The text was modified to include the well designations, their depths and a reference (Ryan, 1966).

3-23 34 **Comment:** N "partially buried drums" on line 4 of this page you referred to these as sumps.

Response: The text was modified to clarify that more than two partially buried drums existed.

3-24 40 **Comment:** N reword to Nitrate was subsequently found. "A-series" there is only one A pond. "drinking water standards" of mg/l.

Response: "drinking water standards of 10 mg/l." The change in the text was made as requested.

3-24 42 **Comment:** S delete "present" and add detected.

Response: Change was made as requested.

3-25 1-3 **Comment:** N What type of new data was acquired?

Response: New nitrate data for ground water. The text was modified accordingly.

3-25 5 **Comment:** N What groundwater and soil studies are you referring to?

Response: The 1974 Dow and Woodward-Thorfinnson studies pertaining to the Nitrate Inventory North of the Solar Evaporation Ponds were referred to. The text has been modified accordingly.

3-25 19 **Comment:** N The sludge drying beds are currently being used.

Response: The text has been revised to reflect current use of the sludge drying beds.

3-25 26 **Comment:** S Reword to This involved removing liquids and sludges from the B-series ponds and transferring them to Pond 207A Pond,

Response: Change to text has been made as requested.

3-26 2 **Comment:** N What was the level of concern?

Response: Approximately 250 counts per minute for alpha activity. The text was modified accordingly.

3-27 16-18 **Comment:** S Add the ITS section in the PA included a surface water infiltration galley in addition to the french drain.

Response: Change was made as requested.

3-29 26-27 **Comment:** S "All" I believe some ITS water is being treated at Building 374 evaporator.

Response: The text has been modified to identify the Building 374 evaporator.

3-29 42 **Comment:** S Delete "information derived" and add results.

Response: Change was made as requested.

Comment: N "Alluvial Soil Material" Alluvial infers deposition by flowing water. Colluvium and weathered claystones can not be combined into this group heading. I recommend renaming this section to Unconsolidated Materials, and removing the reference to weathered claystone. Also, artificial fill materials should be referenced in this section.

Response: Change was made as requested.

3-30 3-31
17 31

Comment: S Change "ranges" to varies.

Response: Change was made as requested.

3-30 16-39 **Comment:** N Provide source for the data presented in this section.

Response: A sentence was added to part VI.3.30, line 8, clarifying the source of these data.

3-30 40 **Comment:** S Change "overburden" to unconsolidated to be consistent with terms.

Response: Change was made as requested.

3-30 41-41 **Comment:** S Reword; Volumetric moisture content in bedrock materials varies from Range is defined as the difference between the largest observation and the smallest observation (i.e. range = largest obs - smallest obs) and is a single number.

Response: Change was made as requested.

Table VI.3.2-1
and VI.3.3

Comment: N Add at RFP or OU4 which ever pertains. Delete "Range" and add Minimum - Maximum. Define "Typical", is this the average or median?

Response: "OU4 Phase I" was added to the title. "Range" was changed to "minimum to maximum". "Typical" was changed to "average".

3-31 23,32 **Comment:** N "overlying materials" use unconsolidated materials if grouping

alluvium, artificial fill materials, and colluvium together, or use alluvial materials if referencing Rocky Flats Alluvium or Valley Fill Alluvium.

Response: "Overlying materials" was changed to "unconsolidated materials" on lines 23 and 32, page VI.3-31.

3-31 24 **Comment:** S CEC values vary...

Response: Change was made as requested.

3-31 27,29 **Comment:** N see previous comment on "overlying soils".

Response: Change was made as requested.

Section
VI.3.2

Comment: N This section is titled Summary and Evaluation of Sources and Soil Data. However, much of the discussion is on groundwater hydrology. I recommend deferring the discussion on hydraulic conductivities until Section VI.3.3 Summary and Evaluation of Geologic and Hydrologic Data.

Response: The section title was changed to "Summary and Evaluation of Geotechnical Properties". The discussion of hydraulic conductivities was deleted from section VI.3.2 and moved to section VI.3.3. In addition hydraulic conductivity data was deleted from tables VI.3.2-1 and table VI.3.2-2 and moved to table VI.3.3-1.

3-32 22-27 **Comment:** N When referencing hydrological parameters discuss the systems as hydrostratigraphic units or subunits such as the weathered bedrock portion of the UHSU.

Response: References to "alluvial aquifer" were changed to "Unconsolidated materials" or "unconsolidated materials portion of the upper HSU" and "bedrock aquifer" was changed to "weathered bedrock portion of the upper HSU where appropriate, in sections VI.3.3.1.

3-31 31 **Comment:** N Please indicate that the data is distributed lognormal and therefore the geometric mean is presented.

Response: The sentence "The geometric mean is used here to accommodate the typical log-normal distribution of hydraulic conductivity data." Note that this part of the section (VI.3.2) has been moved to

section VI.3.3.1.1

Section
VI.3.3.1

- Comment:** N Reference definitions for upper and lower HSU stated in previous comment.
- Response:** The upper and lower HSU's are referenced to section VI.2.1 (Hydrogeology) where a figure has been added to clarify the definition of upper and lower HSU.
- 3-33 21 **Comment:** N The Phase I RFI/RI was a source and soils investigation and should not provide a basis for characterizing the hydrogeology of OU4. I agree it did contribute data to the characterization in the form of groundwater elevations and vadose zone information.
- Response:** The sentence was modified to read "The Phase 1 RFI/RI at OU4 and the RCRA ground water monitoring program have provided data for an initial characterization of OU4 hydrogeology."
- 3-33 21 **Comment:** N "Alluvial Ground Water" I recommend changing the name to UHSU Groundwater. See my second comment on page 1.
- Response:** "Alluvial Ground Water", was changed to "Unconsolidated Materials portion of the Upper HSU".
- 3-33 35-42 **Comment:** N This discussion is on the "bedrock system" (bedrock portion of the UHSU). It is unclear which HSU is being discussed. A discussion on "bedrock system" should be included in section VI.3.3.1.2 Weathered Bedrock Ground Water.
- Response:** This section is discussing the unconsolidated materials portion of the upper HSU. The words "bedrock system" on line 36 (page VI.3.33) were in error and were changed to "unconsolidated materials portion of the upper HSU."
- 5-1 27 **Comment:** E Add of groundwater contaminants after "contribution".
- Response:** This was inserted.
- 5-2 6 **Comment:** E "sources" The only primary sources in OU4 are the pond sludges and fluids.

		Response:	The text has been revised.
5-2	5	Comment:	E add <u>additional</u> before "site specific".
		Response:	The test has been revised.
5-4	5	Comment:	N Change "Borehole Soils" to subsurface soils. This will be consistent with the Phase I.
		Response:	The text has been revised.
5-4	26	Comment:	S "Alluvial Groundwater" Change to UHSU Groundwater Quality. Delete "clearly" instead add the discussion on why this is clearly illustrated.
		Response:	The text has been revised.
5-5	4	Comment:	S "Bedrock Groundwater" See previous comment on UHSU and LHSU.
		Response:	The text has been revised.
5-5	26,27	Comment:	N "Alluvial" use unconsolidated or UHSU groundwater, unless specifically discussing the alluvial groundwater (RFA or Valley Fill).
		Response:	The text has been revised.
Section 5.2.1.2		Comment:	N States the model implies that contaminates migrate in response to different hydrologic gradients via advection-dispersion mechanisms. This statement is true for most contaminates, however, DNAPLs migrate according to topographic gradient regardless of the hydrologic gradient.
		Response:	The text has been revised.
5-6	13,22	Comment:	N VOCs and SVOCs, spell out for headers.
		Response:	The text has been revised.

5-6	18	Comment:	S Change "approach" to exceed.
		Response:	The text has been revised.
5-6	20	Comment:	N "it is easy to understand" Assume nothing is easy to understand and explain why.
		Response:	The comment has been incorporated.
5-6	16	Comment:	N Define "Rd"
		Response:	The definition has been provided. "Rd" is a retardation coefficient and is now fully explained in the explanations to Table 5.2-2.
5-9	1,12	Comment:	N "it is clear" Assume it is not clear and explain.
		Response:	The text has been revised.
5-9			
5-11	42		
7,8,34		Comment:	N "CLP-TAL" Spell out. Also this is a acronym for contract laboratory program - target analyte list. It is not a analytical method.
		Response:	The text has been revised. The reference is to the method specified in the CLP contract.
5-12	6	Comment:	N Change "Unsaturated Zone Soils" to Subsurface Soils
		Response:	The text has been changed.
5-12	38-39	Comment:	N I assume this sentence is referencing upgradient wells. State which wells will follow this specific sampling plan.
		Response:	The wells have been specified.
Table VI.5.2-3		Comment:	N "CLP-TAL" See comment above.
		Response:	The correction has been made.

5-14	20	Comment:	N Water levels at these location should already be measured on a monthly interval in OU4. This effort was coordinated with the groundwater sampling subcontractor through EG&G's Geoscience Division.
		Response:	The wording of the comment suggests that there may be some doubt as to whether the water level measurements are being performed. If so, ES requests that EG&G confirm that water levels are measured in the referenced wells on a monthly basis. The text has been revised to reflect that an ongoing measurement program is already in place.
5-14	8,24	Comment:	"alluvial wells" see comment above on the use of alluvial when describing a hydrostratigraphic unit.
		Response:	The term "alluvial" has been replaced with "unconsolidated materials".
5-14	29	Comment:	N Change "will to may.
		Response:	The requested change was made.
Figure VI.5.3.1		Comment:	N "Alluvial " see comment above on use of alluvial.
		Response:	The term "alluvial" has been replaced with "unconsolidated materials".
5-25	1,2	Comment:	N "Bedrock Wells" See comment above on use of bedrock aquifer.
		Response:	The terminology in this paragraph has been revised to incorporate the usage of the "unconsolidated materials and weathered bedrock portions of the UHSU" rather than the "alluvial and bedrock aquifers".
General		Comment:	N The trilinear diagrams state that, base on major ion chemistry, the groundwater of the RFA, VFA, Colluvium, and weathered claystone are similar, and mixing occurs. If this statement is true, why are weathered bedrock wells proposed for characterization purposes?

Response: Although the trilinear diagrams do confirm that the alluvial and unweathered bedrock hydrostratigraphic units are hydrologically connected and therefore both part of the Upper HSU, the following differences recommend installation of monitoring wells in both units: (a) the unweathered bedrock interval may serve as the only or primary ground water conduit in areas where alluvium has been removed or is very thin (eg., the north hillside) or where the ITS is not fully anchored in unweathered bedrock; (b) the hydraulic conductivity of the weathered bedrock is clearly different than the overlying alluvium as is the lithology so contaminants may be expected to have different mobilities in each unit; (c) several organic contaminants (esp. halogenated hydrocarbons like TCE) are higher in the unweathered bedrock relative to the alluvium and toluene and TCA are present in the alluvium and absent in the weathered bedrock.

Figure
VI.5.3-4

Comment: N Is the Bld 774 Pond presented in this figure "Bowmans Pond"? And if so is this the "official" name of the pond?

Response: The pond in reference is "Bowmans Pond" although, there is no "official" name for the pond. The document now consistently refers to the pond as Building 774 Pond.

5-31 20

Comment: N Were geologic units colluvium and artificial fill intentional left out?

Response: No, colluvium and artificial fill were added to the text. The hydraulic properties of these units will also be characterized by slug tests.

5-32 25

Comment: N Please refer to these aquifer tests as pumping tests. Pump tests indicate the testing of a pump. Test B is located in the ITS area which is characterized as artificial fill materials. Please reference Part II, Phase I RFI/RI geologic maps.

Response: The corrections were made.

5-32 37

Comment: E Should a comma follow Pond 207-C?

Response: The sentence fragment was deleted.

5-32 40

Comment: E Delete sentence "a pumping well and two...." Previously stated

in lines 28 and 29.

Response: The correction was made.

5-37 44 **Comment:** N GPR proved _____?

Response: The omitted words were added.

5-40 25,26 **Comment:** N "surficial" and "alluvial" See previous comments on usage.

Response: "Surficial" has been replaced with "unconsolidated" where the context refers to the geologic material above the weathered bedrock surface in general and is not specific to the truly surficial (at the surface) material.

"Alluvial" has been replaced by "alluvium" when the context refers to unconsolidated material deposited by alluvial processes.

5-40 38 **Comment:** N Change "no" to little.

Response: "No" is now preceded by "virtually"

5-41 9-12 **Comment:** N Please provide the methods to be utilized for determination of geotechnical properties. What analytes will Kd values be determined? How many samples or tests will be conducted?

Response: Table 5.4-1 has been revised to provide the details required.

5-41 35 **Comment:** N Text states that 4-inch wells will be installed for pumping tests.

Response: It is likely that 4 inch wells will be required to accommodate the equipment required for pumping tests.

5-42 1 **Comment:** N Will surface casing be required utilizing sonic drilling techniques?

Response: Current procedures (5-21000-OPS-GT.3, Rev. 2, "Isolating Bedrock From the Alluvium with Grouted Surface Casing") require the installation of surface casing. There is no reason to believe at present that this requirement will not apply to monitoring wells installed in boreholes produced by resonant sonic drilling since the requirement is not dependent upon the method of drilling. However, current limitations of resonant sonic drilling do

not allow installation of surface casing as described in the above SOP. Resolution of this problem is pending the results of near-term testing of the procedures at OU-11.

Tables

3.4-1

3.4-2

Comment: N Barium - has a background concentration of 401 which is greater than the maximum (detected?). How can barium be detected at 97%? Also, typically environmental data is distributed lognormal, would the geometric mean be more appropriate for these table? Should use the UTL_{95} for background to be consistent with IM/IRA and Phase I RFI/RI reports. In footnote "75 laboratory results" What does this mean?

Response: This has been revised.

3-36 38

Comment: N Maximum water levels are projected beneath the B-Series ponds and indicate that the water table may exceed the surface (top) of the liner of Pond 207B-South only at elevation 5965.0 feet.

Response: The word "base of the pond liner" were changed to "elevation of the pond floor".

Figure 3.3-6

Comment: N Indicate 5965.0 feet is the bottom of the surface of the Pond 207-B South.

Response: The words "pond floor" were added to the figure.

3-43 9

Comment: N Delete "some" and add a portion of the existing ponds.

Response: Change made as requested.

Table

3.3-2

Comment: See T. Lovseth's comment in Part II comments concerning this table and geologic cross-sections.

Response: The Phase II writers incorporated T. Lovseth's comments into the appropriate table and figures.

General

Comment: N Remove "clearly" from work plan and explain concept.

Response: "Clearly" has been removed from the work plan.

3-57 13 **Comment:** S Delete "affected by any leakage" and add impacted. It is assumed that the ponds leaked to affect groundwater.

Response: Change has been made to text.

3-57 19,20,
21,22 **Comment:** S State what the considerable variation is (i.e. 1 - 20000). Change pond leakage to pond waters. Define "local groundwater", does this imply upgradient? Figures ___ and ___ provide trilinear diagrams of the Upper HSU groundwater....

Response: Range of TDS values has been specified. "Local background" has been defined as being "representative of ground water before being impacted by pond water". Although "upgradient" is implied and probably true for wells located west of the ponds, it may not be strictly true in all cases.

Line 22-23 was modified to make reference to trilinear diagrams.

3-57 27 **Comment:** S delete "affected by leakage from" and add impacted.

Response: Change has been made to text.

3-57 32 **Comment:** S Reference figure with location of the wells discussed in this section.

Response: The reference has been added.

3-57 42,43 **Comment:** S Change mixture to amounts or volumes. What is the source of data for pond water collected from Pond 207A?

Response: Entire section has been rewritten and now includes source of data requested.

VI.3.3.2.4 Mixing of Pond Waters with Ground Waters. Ground water compositions observed in monitoring wells proximal to the SEPs are assumed to have resulted from the mixing of "local background" ground water with process waste water that leaked from the SEPs. Supporting this assumption is complicated by the fact that the composition of waste water placed in the ponds changed over the history of RFP operations. In general, old process wastes (ca. 1962 and earlier, data contained in miscellaneous reports, Dow Chemical Company) contained up to ten times the dissolved solids present in modern pond wastes (based on 1991 analyses, "Phase I RFI/RI Work Plan, Solar Evaporation Ponds, Operable Unit No. 4", EG&G Rocky Flats, 10/30/91). However, the overall chemistry of the pond wastes (with respect to the water types and components included in the trilinear diagrams) remained rather constant over the same period. The result is that all pond wastes plot near the right apex of the quadrilateral with large diameter circles (especially for the old pond waters) indicating the TDS.

Trilinear diagrams may be used to visualize the mixing of two waters. If mixing of a representative pond water (end-member 1) and "local background" ground water (end-member 2) is a viable hypothesis for explaining an observed ground water composition, a line on the trilinear diagram connecting these two endmembers should

pass through the position of the observed ground water. Additionally, the observed TDS of that ground water should be equal to that calculated for the mixture composition that corresponds to the observed composition. Figure VI.3.3-20 is a trilinear diagram containing mixtures of 2286 ground water and 1991 207-A pond water. Selected intermediate compositions were calculated using SOLMINEQ.88^o (Aggarwal, P. K. et al. (1989) SOLMINEQF: A computer Code for Geochemical Modeling of Water-Rock Interactions in Sedimentary Basins. Proc. 3rd Canadian/American Conf. on Hydrogeology, in B. Hitchon (ed.) Hydrogeology of Sedimentary Basins: Applications of Exploration and Exploitation, National Water Well Assoc., Dublin, OH.) although a straight line between end members will always be valid (assuming no heterogenous reactions remove or add components).

Figure VI.3.3-20 suggests, at least in general terms, that the ground water from monitoring well 2886 (see Fig. VI.3.3-18) could be generated by a mixing scenario similar to that described above. However, a more detailed examination (not discussed here) including the available nitrate data indicates that a component of old pond water (in addition to the more dilute 1991 pond water) is necessary to obtain the observed nitrate, chloride and TDS values observed in 2886. The necessity to include old pond waters in an acceptable mixing scenario indicates that old pond water is preserved beneath the ponds, probably as trapped pore water. Furthermore, a comparison of 2886 ground water chemistry to water level data reveals that there is interaction (mixing, desorption and/or mobilization of colloids) between the ground water and pore water when ground water rises into the vadose zone due to seasonal fluctuations.

The mixing scenario described above (regardless of the pond water(s) selected as an end-member) cannot explain those ground water compositions plotted near the upper apex of the trilinear diagram (see Figure VI.3.3-18). These ground waters, which include those from monitoring wells completed in the weathered bedrock on the hillside north of the SEPs, are enriched in Ca relative to the pond waters and ground waters close to the SEPs. A possible explanation for this observation is that sodium-rich, pond-derived water moving through vadose zone and/or alluvial and/or weathered bedrock materials was enriched in calcium and depleted in sodium due to cation exchange.

Section 3.3.2.4

Comment: N Where was the mixing hypothesis originally stated? Affecting (impacted) was previously stated. Is a 1:1 volumetric mixing possible? Does this imply that the ponds were leaking at the same rate as groundwater flow?

Response: Entire section has been rewritten to accommodate comments and clarify concepts.

3-58 20

Comment: N "Uncontaminated" Should this read upgradient or define uncontaminated.

Response: "Uncontaminated" has been replaced by "Low TDS".

3-58 26

Comment: N Define "background". Does this reference RFP background?

Response: "Background" has been replaced with "local background" in the context of a new sentence which reflects the additional discussion in the rewritten VI.3.3.2.4 section.

Figure 3.3-17

Comment: N Add the words Legend to all maps. Remove (size of circle indicates TDS) from title block and install in map legend. Do

plots with no circles need scale? Place scale in map legend.

Response: This comment applies to Figs. VI 3.3-16 through VI 3.3-21. "Legend" has been added to all figures. "(Size of circles indicates TDS)" has been removed from the title block and placed in the legend. Only plots containing concentration information (those with circles) include a scale. Unfortunately the software (HC-GRAM) does not allow repositioning the concentration scale in the legend.

Section
3.4.2.2

Comment: S Change name to Subsurface Soils.

Response: Change incorporated.

COMMENTS AND RESPONSES

Page 1 of 21¹³

TO THE OU4 IM/IRA ENVIRONMENTAL ASSESSMENT DECISION DOCUMENT

Page # Line # Commentor:Greg DiGregorio, SAIC Part: I II III IV V VI

VI.1-1E	31	Comment:	Typographical error.
		Response:	Corrected
VI.1-1N	41	Comment:	According to the IAG, the Phase 1 (soil) and Phase 11 (groundwater) programs are to be separate studies and therefore are to be conducted separately with respect to the CMS/FS. The Phase I program didn't go through the CMS/FS process. Only the RFI and RA process was performed and therefore, the combination of the two studies is incomplete.
		Response:	This comment is incorrect. The IAG specifically discusses the CMS/FS process as the combination of Phase I and II RFI/RI work.
Section 1N	General	Comment:	Section 1 is suppose to be the Introduction which contains the following: Environmental Restoration Program; Work Plan Scope; and the Regional and Plant Site Background Information. See the RFP ERM Administrative Procedures Manual for Work Plan Development, 05.09, Rev.0, Draft M.
		Response:	The manual referenced was not available until after the work plan was submitted to EG&G. The existing introduction complies with the IAG and EPA guidance.
VI.2-1N	18	Comment:	How are the two HSUs distinguished from each other? is the water quality (pH, conductivity, hydraulic conductivity, etc.) different enough between the two HSUs for them to be segregated? Explain more thoroughly.
		Response:	This information is presented in Section 3 of this document.
Fig.VI.2.0-1N	Fig.	Comment:	What does the hashed area in the figure represent? Include this in the legend and identify the actual trench more clearly.
		Response:	The hashed area is the Interceptor trench system. The legend includes this.
Figures AllN	Fig.	Comment:	The legend needs to be more complete and explicit with regard to what is depicted in the figures.

		Response:	This comment is acknowledged. Improvements to the legends have been made.
Fig.VI.2.2-1N	Fig.	Comment:	The figure is a terrible copy for the type of report being generated. Redraw the figure.
		Response:	This figure has been redrawn.
VI.2-4N	20-29	Comment:	There appears to be a direct correlation with nitrates and radionuclides as is evident in the isopleth maps. Since nitrates (anions) move faster in groundwater than the radionuclides (cations), then the potential exists for the radionuclides to migrate in the same path with the nitrates or combined to each other because of their chemistry. Elaborate on this possibility.
		Response:	Understanding the contaminant migration in ground water is an objective of the Phase II RFI/RI field work and will be explained once the field data has been collected.
Section 2N	General	Comment:	Section 2 is supposed to be Site Characterization which includes the following: Site Characteristics; Nature of Contamination and Previous Investigations; and the Conceptual Site Model. Make the necessary changes.
		Response:	The work plan format presented complies with the IAG and CERCLA guidance.
IV.3-9N	Page	Comment:	A page is missing from the document that further summarizes the events of the 1975 Engineering Study.
		Response:	The table has been reprinted with complete text.
VI.3-11E	Table	Comment:	Define the use of "M" in the last column.
		Response:	This typographical error has been changed to "N".
VI.3-32N	Summary	Comment:	The summary sections clearly identify that the ponds were "a major source of groundwater" due to leaking. This statement and documentation contradicts what was stated in Part III (the ponds don't affect the groundwater). Part III needs to be re-developed and the writers of the documents need to get together using analytical data, modeling and sound scientific processes to establish how the ponds affect the groundwater.
		Response:	This comment has been passed along to the Part III authors.
VI.3-32N	General	Comment:	What segregates the Upper and Lower HSUs? Define this for

establishing well placement and groundwater characterization of OU4.

Response: An aquitard separates the Upper and Lower HSUs. The aquitard is considered to be unweathered, unfractured claystone bedrock identified by its lack of oxidation coloring and lack of fractures. Geophysical data will also be utilized to help determine weathered zone thickness and placement of screened intervals.

VI.3-33N 14 **Comment:** Why isn't the previously collected groundwater data used for the development of the work plan? Historical data with respect to groundwater quality and analytical data can be used for correlating the groundwater plume and the leading edge (halo) for contaminant migration.

Response: The reports referenced in lines 14 through 16 include "previously collected ground water data." This entire work plan was developed utilizing historical data.

VI.3-43N 1 **Comment:** The text indicates that groundwater mounding is occurring under the 207-B pond which directly contradicts what is being stated on page II.5-2 line 31. The documents need to be consistent with what is believed to be occurring at the site in order to establish remediation alternatives. The remedial design for the soils will directly impact the remedial design for the groundwater. Correct this issue.

Response: The text has been modified to indicate that ground water occurs at a shallow depth beneath the ponds.

Figures VI.3.3-10
to VI.3.3-15 Fig.

Comment: The majority of the wells are screened in both of the HSUs, thus creating cross-contamination between the units and not supplying substantiating results on the quality of groundwater from the separate HSUs. It is stated in the text (page VI.3-47, line 19) that fractures in the claystone bedrock are potential pathways for contamination to enter the lower HSU. These wells should be abandoned and the analytical results should be considered invalid since there is no control on the origin of the groundwater. The potentiometric maps are also incorrect if these wells are screened in both HSUs.

Also, include the lithofacies type (Sandy, Silty-Clay, etc.) in the legend of each figure.

Response: The upper portion of bedrock (weathered claystone bedrock, subcropping sandstone or siltstone bedrock), where in hydraulic connection with the Upper HSU, is considered part of the Upper HSU. A conceptual lithologic illustration (new Figure 2.1-1) has been added to clarify the working definition of Upper and Lower HSU. The fractures mentioned on line 19 refer to those in the weathered claystone bedrock, a part of the Upper HSU. Lines 23 and 24 admit the lack of understanding of the interconnection between the Upper and Lower HSUs. Investigating this interconnection is one objective of this Phase

II Work Plan. The analytical results and water elevations from these wells are considered questionable.

Descriptive lithology terms (Sandy, Silty-Clay) have been added to Figures 3.3-11 through 3.3-15.

IV.3-57S

41

Comment:

Include the model and the various input parameters and results in an appendix for reference and reproducibility.

Response:

Considering the minor and purely qualitative application of the modeling results being referred to in this comment, we do not consider the inclusion of an appendix-scale elaboration appropriate.

The model used (SOLMINEQ.88) is now referenced completely in the reference section of the document.

The model used assumed purely conservative mixing conditions with no precipitation or dissolution (obvious by the straight line plot on the trilinear diagram). This assumption is probably not strictly correct given the calculated saturation indices of some solid phases in the pond water. However, the fact that certain common phases appear to be supersaturated in the pond water suggests either poor analytical data and/or modeling problems due to the very high ionic strength. In either case the level of effort required to resolve this dilemma is outside the scope of the work plan and may be worthy of incorporation into the final Phase II report.

Fig.VI.3.3-1N Fig.

Comment:

The potentiometric map is to be of the site using current data. Why is the 1992 potentiometric map used for the site. Discard this map and use the most current data. Also, what does alluvial materials have to do with the potentiometric surface? Change the title of the map to reflect what the map is.

Response:

1992 data was used because 1993 data was not available when the potentiometric surface maps were initially generated for the work plan. Subsequent comparison of 1993 potentiometric maps with 1992 maps shows minor variations between the two sets of data. In some areas the alluvium was dry in 1993 where it was wet in 1992. This would be expected as a response to removal of water from Ponds 207A and 207B-Center. The overall ground water flow patterns do not change from 1992 to 1993.

Alluvial materials are related to the potentiometric surface because water level data used to generate the potentiometric surface map is collected from wells completed in (screened in) alluvial materials.

The map title was changed to "Potentiometric-Surface Map, UHSU Unconsolidated Materials, Second Quarter (April) 1993."

Fig.VI.3.3-2N Fig.

Comment:

The potentiometric map is to be of the site using current data. Why is the 1992 potentiometric map used for the site. Discard this map and use the most current data. Also, what does alluvial materials have to do

with the potentiometric surface? Change the title of the map to reflect what the map is.

Response: 1992 data was used because 1993 data was not available when the potentiometric surface maps were initially generated for the work plan. Subsequent comparison of 1993 potentiometric maps with 1992 maps shows minor variations between the two sets of data. In some areas the alluvium was dry in 1993 where it was wet in 1992. This would be expected as a response to removal of water from Ponds 207A and 207B-Center. The overall ground water flow patterns do not change from 1992 to 1993. This explanation has been add to the text on page VI.3-33, line 23.

Alluvial materials are related to the potentiometric surface because water level data used to generate the potentiometric surface map is collected from wells completed in (screened in) alluvial materials.

The map title was changed to "Potentiometric-Surface Map, UHSU Unconsolidated Materials, Fourth Quarter (August) 1993."

Fig. VI.3.3-4
and VI.3.3-5N Fig.

Comment: Include the well ID numbers for each of the wells. Explain what the contours are in the southeast portion of the map and how the dry areas throughout the map were made when no wells are present. Re-do the map to show the actual potentiometric surface with the actual water level data.

Response: Well ID numbers were added to the map. The contours in the southeast portion of the maps are artifacts from the contouring process and have been deleted from the maps. These maps were generated by contouring the maximum historical unconsolidated materials potentiometric surface and the weathered bedrock surface. Areas of unsaturated alluvium are defined where the elevation of bedrock exceeds the unsaturated materials potentiometric surface. In some areas of the maps, dry areas are identified even though there is no well in that area. These dry areas are defined by the intersection of two contoured surfaces. The purpose of these maps is to identify potential ground water pathways in the saturated unconsolidated materials. One sentence was added to page 3-36 line 32 of the text explaining how these two maps were generated.

Fig. VI.3.3-6N Fig.

Comment: What is the significance of the designation of 207-B South? Is this line the base of the pond? If so, identify it as such.

Response: The figure illustrates that when water elevation is greater than the pond floor elevation, the alluvial aquifer is probably locally confined by the pond liner material. The base of the pond (the pond floor) has been identified on the figure.

The line labeled "207B-South (ft) = 5965.0" indicates the elevation of the base of this pond. Figure has been amended to reflect this.

Fig. VI.3.3-7N	Fig.	Comment:	The figure is depicting the subcropping bedrock lithology of OU4, why are there alluvial wells on the map? Remove all of the alluvial well locations from the map, they are not pertinent to the discussion. The wells are not included in the legend either.
		Response:	The alluvial boreholes typically penetrate 4 to 6 feet into bedrock and are, therefore, necessary data points for constructing the subcropping bedrock lithology map. The borehole locations are shown for clarity. All alluvial wells penetrated 2-5 feet of bedrock as per Procedure GT.6, Rev. 2, "Monitoring Wells and Piezometer Installation", 3/1/92, (DCN 93-1). The lithologic information from these wells were used to compile subcrop information in addition to the bedrock well lithology. All well types are identified in the legend.
Fig. VI.3.3-8N	Fig.	Comment:	Remove all of the alluvial wells from the map. They are not included in the legend and are not pertinent to the discussion.
		Response:	The alluvial wells have been removed from the map.
Fig. VI.3.3-10N	Fig.	Comment:	The figure doesn't identify all of the wells and boreholes used in drawing cross-section A-A'. The ID numbers of the wells and boreholes should also be included for reference.
		Reference:	There are nine boreholes on cross section A-A' (Figure VI.3.3-11) and nine boreholes on the line of cross section A-A' (Figure VI.3.3-12). (There was a discrepancy on the B to B' line which has been corrected.) The wells and boreholes have been labelled on the map.
Fig. VI.3.3-11N	Fig.	Comment:	Wells 41993, 41693, and 43293 identified in the cross-section are not found on any of the potentiometric surface maps. Are these wells or are they boreholes as stated in the legend of the figure?
		Response:	They are boreholes. 1992 and 1993 RCRA groundwater data was used in constructing potentiometric surface maps.
IV.3-64	30	Comment:	What is the apparent reason for the ITS no being able to accept any more water from the West Collector? Include the possible explanation for the hydraulic connection being cut off.
		Response:	The cause of the failure of the hydraulic connection between Building 774 (Bowman's) Pond and the West Collector which occurred sometime between fall 1990 and fall 1992 was unknown as of the time of the last reported examination in spring 1993. A more detailed explanation is presented in Appendix VI. B.
IV.3-66E	13	Comment:	Include "water" after surface.
		Response:	"water" has been inserted after "surface".

IV.3-72N	33	Comment:	Define "principal contaminants".
		Response:	The text was changed to "other contaminants."
IV.3-73N	1	Comment:	What are the relative concentrations (give a range) detected. The terms high, medium, and low have no meaning.
		Response:	The concentration ranges are provided in the IM/IRA. The point of this table is to identify contaminants and provide relative weight to their occurrence.
IV.3-73N	20	Comment:	What is the associated cation with the Nitrates? Could this possibly be Pu or another radionuclide? Since the seeps are contaminated with radionuclides and they are considered groundwater, wouldn't this type of contamination be found in wells downstream?
		Response:	The major cations in the greater SEP area are Na, K, Ca, and Mg. Wells downgradient of the seeps do contain similar contaminants as clearly shown in section 3.4.3 of the Work Plan.
VI.3-75N	1	Comment:	Are the results of the study validated with respect to laboratory validation only or does this also include validation with respect to usability? If only laboratory validation is conducted, then any unvalidated data still may be accepted for usability. Clarify this statement.
		Response:	The results of the study are validated with respect to the lab only. In practice, the primary user is responsible for useability validation. Secondary users (work plan authors) are only using the data to determine the general areas and levels of contamination.
VI.3-75N	General	Comment:	Include the relative ARARS for the comparison of the data presented.
		Response:	No soils ARARs exist. At RFP, ARARs for waters have historically been developed during feasibility studies. Appendix C has been added to this work plan presenting sitewide benchmark tables, the DOE/EG&G "preliminary ARARs" equivalents.
VI.3-77N	1	Comment:	Are the results of the study validated with respect to laboratory validation only or does this also include validation with respect to usability? If only laboratory validation is conducted, then any unvalidated data still may be accepted for usability. Clarify this statement.
		Response:	The results of the study are validated with respect to the lab only. In practice, the primary user is responsible for useability validation. Secondary users (work plan authors) are only using the data to determine the general areas and levels of contamination.
VI.3-77N	19	Comment:	The common laboratory chemicals detected in the soils have not been clearly substantiated as being laboratory contamination. The data should be validated according to the EPA document "Risk Assessment

Guidance for Superfund, 1989". Confirm the latest results from the soil study.

Response: The schedule does not allow us to await validation. Since the Work Plan uses the Phase I data only for generalized interpretations, it is not necessary to await validation. EPA lists the aforementioned chemicals as common laboratory contaminants.

VI.3-77N 35 **Comment:** What is a laboratory artifact? The data can be validated with respect to confirmation results, QA/QC samples and laboratory commentary containing substantiating evidence. Until data validation with respect to usability is conducted, the data should be considered a positive detection.

Response: The schedule does not allow us to await validation. Since the Work Plan uses the Phase I data only for generalized interpretations, it is not necessary to await validation.

VI.3-78N 16 **Comment:** The data can be validated with respect to confirmation results, QA/QC samples and laboratory commentary containing substantiating evidence. Until data validation with respect to usability is conducted, the data should be considered a positive detection.

Response: Prior to validation, positive detections were not assumed for EPA identified lab contaminants. The use of the data for work plan development does not require the overly conservative approach suggested.

VI.3-78E 27 **Comment:** The sentence does not make sense. Re-write the sentence.

Response: The sentence was more clearly written.

VI.3-80N 7-15 **Comment:** The groundwater quality presented in the text doesn't describe any trends of the contamination moving or degrading to another contaminant. The purpose of conducting quarterly monitoring is to look for contamination migration trends. Was this data validated with respect to usability? What is the trend of contamination migration? Further explanation and more validation is needed to substantiate the basis of the approach used.

Response: In OU4, the Phase II RFI/RI is essentially a ground water investigation. Thus, contaminant migration and degradation will be more specifically addressed in the Phase II RFI/RI report. A work plan is a compilation of data from many sources. The useability of the data is evaluated by the primary user. Secondary users, such as work plan authors, use the data for a coarse interpretation of contamination.

VI.3-80N 17-24 **Comment:** Include the results of the statistical tests and the differences for verification and interpretation.

Response: The reader should refer to the 1992 RCRA Groundwater Monitoring

Report for this information.

VI.3-80E **General Comment:** The units of measure should be consistent throughout the document for ease of reading and interpretation. Also, define the chemical contaminant acronyms used in the text.

Response: The work plan is a presentation of existing data from many sources. Consistency is strived for, but with many data sources, not always achievable.

VI.3-80N 36 **Comment:** The text indicates that mounding underneath the ponds may contribute to the contamination of the groundwater to the south west of the pond 207-C. All of the potentiometric surface maps identify the groundwater flowing to the north east. Is there proof in making this assumption (e.g., based upon water level data collected from wells around the 207-C pond, the groundwater is flowing to the south west)? Develop potentiometric surface maps using the most current data available to support this assumption.

Response: The author merely suggests that a ground water mound could provide the necessary gradient that would allow contamination to flow from Pond 207-C to the south. Such a mound may have existed in the past, but there is no evidence for the mound at present. Text has been added to further clarify this point.

It is important to note that the data presented in the 1992 and 1993 Groundwater Monitoring Reports differ primarily in the number and distribution of samples. The levels and spatial distributions of the contaminants in the ground water system indicated by the data do not differ significantly in 1992 and 1993. Thus, the maps presented in the work plan are thought to adequately represent the aquifer conditions.

VI.3-80N 39 **Comment:** What is the level of vinyl chloride detected in the groundwater?

Response: Water sampled from well 3586 contained up to 720 ug/L of vinyl chloride. The text was revised to include a reference to Figure 3.4-1.

Fig. VI.3.4-1N Fig. **Comments:** The VOC plume appears to be moving to the south, which is against the groundwater flow direction identified in figures 3.3-1 and 3.3-2. The figure is also using 1992 data or earlier and doesn't include the most current data available. Explain how the contamination was contoured at well P208089. Where is the source and how does contamination pass through the unsaturated area? This figure and the interpreted text needs to be re-developed. Also, include maps for specific compounds so that the degradation series can be analyzed and contaminant migration trends established.

Response: The 1993 RCRA report was not available during preparation of the work plan. A focus of the field investigation is to characterize the relationship between the weathered bedrock and the unconsolidated sediments. Maps for specific compounds are appropriate for an RI

Report. The intent of the work plan is to provide guidelines to identify data required, not develop degradation trends.

VI.3-90N	3	Comment:	Explain how the downward vertical hydraulic gradient was determined in the bedrock? Is it possible that there may be contamination from another source area contaminating the bedrock aquifer and migrating to the north? Why doesn't other types of contamination (radionuclides, etc) react this way?
		Response:	A reference to the 1992 RCRA Groundwater Monitoring Report has been added to the text. The Report uses water level measurements from pairs of closely spaced alluvial and bedrock wells to estimate the downward gradients in the SEP area. The VOCs cited in the text have a density greater than that of water; therefore, these compounds preferentially migrate downward.
VI.3-93N	Table	Comment:	The unweathered bedrock wells 3987 and P208889 are have their screened intervals listed in the table but they don't match up with the cross-section found in Figure VI.3.3-12. The cross-section doesn't include the screened interval either. Also, are the wells cased off as they pass through the vadose zone and the weathered bedrock? Well construction diagrams would be useful to verify that no cross contamination is occurring due to poor well completion.
		Response:	Clearly, the screened intervals for wells 3987 and P208889 are not shown in Figure VI.3.3-12 because the screens fall below the bottom of the page. In general, the wells in OU4 are not screened across the unconsolidated material and weathered bedrock. It is the goals of the Well Assessment and Replacement Program to determine the suitability of wells for sampling.
VI.3-93N	25	Comment:	The text indicates that there is a distinction between alluvial, weathered bedrock, and unweathered bedrock groundwater. Explain how these ground waters can be distinguished from each other and are not hydraulically connected. If the ground waters are separated from each other, then some wells should be abandoned since the screens penetrate through two hydraulic units. This could be the explanation why contamination is getting into the bedrock groundwater.
		Response:	All of these ground waters may be hydraulically connected, at least locally. The weathered bedrock and alluvial/unconsolidated sediments are both part of the Upper HSU and the interaction between these two units is greater. The level and occurrence of the contamination in the alluvial/unconsolidated sediments, the weathered bedrock, and the unweathered bedrock are different.
Figs.VI.3.4-8, 9, 10, and 11N	Figs.	Comment:	All of these figures are too small and cannot be read. Re-do the Figures so that they are legible.

		Response:	The figures have been reproduced at a larger scale.
Fig. VI.3.5-2N	Fig.	Comment:	The figure identifies two aquifers, the alluvial aquifer and the bedrock aquifer. What is the characteristic that separates the aquifers and if they are different, some of the previously installed wells and piezometers will have to be abandoned.
		Response:	The physical properties including lithology and hydraulic conductivity, and the levels of contamination associated with the two water bearing units are different.
Section 3N	General	Comment:	Section 3 is suppose to define ARARs as stipulated in the Rocky Flats Plan ERM Administrative Procedures Manual for Work Plan Development, 05.09, Rev. 0, Draft M. This section is written as if it is a report on the findings from previous investigations and not just the historical data of the site. Follow the guidance on writing the Work Plan and move this section to Section 2.
		Response:	The Manual for Work Plan Development was issued March 21, 1994. The work plan was submitted February 15, 1994. Thus, the work plan precedes the manual. The work plan as written conforms with EPA guidance on work plan development. Appendix C, Sitewide Benchmark Tables, has been added to present the preliminary ARARs.
VI.4-6N	23-28	Comment:	The analytical methods to be used for the sampling program need to specified in order to verify that the data collected will be comparable to the historical data. Include the analytical methods to be used for the Phase II program.
		Response:	The analytical methods, analytes and associated detection limits have been added to Section 5.
Section 4N	General	Comment:	The PARCC parameters need to be more specific as to how these QA/QC goals will be achieved. Include the goals for each parameter, how the goals will be achieved, equations to be used in calculating any of the parameters, and tables or matrices to be used for illustration. Refer to the RFP Draft-Evaluation of ERM Data for Usability in Final Reports for guidance in developing the this section.
		Response:	The PARCC parameters section has been revised to provide additional detail.
Section 4N	General	Comment:	The DQOs are not adequately addressed in this section and need to be changed to incorporate the process outlined in the following EPA document: EPA, August 31, 1993; <u>Data Quality Objectives Process for SUPERFUND: Interim Final Guidance</u> ; Office of Solid Waste and Emergency Response, Washington D.C.; EPA 540-R-93-071. The seven step process outlined in the document has been established to streamline the process, be cost effective and still meet the QA/QC objectives.

Response: The DQO process used to support this work plan is in compliance with both the IAG requirements and the EPA guidance "Data Quality Objectives for Remedial Response Activities". The newer EPA guidance document referenced in the comment is now available, but was not readily available during work plan development (several EPA sources told us the document was still not available). The newer guidance document has been reviewed and the conclusion has been drawn that the recommended seven step process would result in only minor changes to the result of the DQO methodology employed. The newest guidance has been incorporated and referenced wherever possible.

Tbl.VI.5.2-3N Table **Comment:** Include the exact analytical method to be used during the sampling program and the detection limits. The EPA CLP program includes various analytical methods and they should be specified in the FSP since this is the guidance to follow for conducting field work. Verify that the analytical methods selected for the Phase II program are the same to methods used in previous investigations and that the collected data can be compared to the historical data.

Response: The analytical methods, analytes, and associated detection limits have been added to Section 5.

VI.5-12 and VI.5-13N General **Comment:** Do not reference the GRRASP or any other document for the analytical suites to be collected during the Phase II program. This document is the guidance for conducting the field work and these analytical suites need to be specified.

Response: The analytical suites have been specified.

VI.5-14E General **Comment:** Reference the Figures that identify the current and proposed well locations to be drilled and sampled.

Response: References to Figures VI.5.3-1 and VI.5.3-2 have been added to Section VI.5.3.1.1. These figures are also referenced in Sections VI.5.3.1.2 and VI.5.3.1.3.

Tbl.VI.5.3-1N Table **Comment:** Include an explanation of the proposed wells in the table. Also, the table indicates that 13 alluvial wells will be drilled at OU4 and the text on page VI.5-14 indicates that only 11 alluvial wells will be drilled. Clarify the actual number of wells to drilled in the alluvium at OU4.

Response: This table and text has been revised.

Figs.VI.5.3-1 and VI.5.3-2N Figs. **Comment:** Why are there no alluvial wells located below the 207-C pond? Include

in the figures the ITS for reference and clarification since this system is part of the Phase II program.

Response: Historically there has been no water in the alluvium north of 207-C pond, hence no reason to install alluvial wells there. The ITS system has been added to Figures 5.3-1 and 5.3-2.

VI.5-25N 20-24 **Comment:** Since the seeps are discharge points for the groundwater at OU4, and that these points are one of the main pathways for the conceptual model, shouldn't the continued monitoring of them by the groundwater program be beneficial for the OU with respect to trends. The integrity of the sampling regime, quality control and data comparability could be jeopardized for the post closure monitoring of the OU.

Response: The purpose behind the wording of this text is to limit the scope of sampling under this Phase II RFI/RI investigation. It is not appropriate for the Phase II work plan to specify sampling beyond the scope of the Phase II investigation. The importance of continued sampling under other programs is also noted in this paragraph.

VI.5-51N 38 **Comment:** The decontamination pad currently will not accept any waters from drilling activities or monitoring well activities. As for other treatment facilities on plant site, these facilities are permitted for specific OUs and types of waters. Extensive sampling may be necessary as well as agency by-off for these facilities to accept these waters. Also, the waters must meet the requirements of the NPDES permits as the treated water is being discharged into the various drainages. It is critical to the program to have the treatment system permits changed to accept additional waters before Phase II starts.

Response: This paragraph has been modified to reflect recent developments in handling purge and development water as specified in SOP FO.05 (Rev. 2) February 25, 1994. Procedures for handling the water as well as EG&G and subcontractor responsibilities are outlined in this SOP.

General **Comment:** Review the following document for writing the Phase II Work Plan: Rocky Flats Plan ERM Administrative Procedures Manual for Work Plan Development, 05.09, Rev. 0, Draft M.

Response: This document was reviewed when received, after development of the draft work plan. The draft work plan follows EPA guidance.

**COMMENTS AND RESPONSES
TO THE OU4 IM/IRA
ENVIRONMENTAL ASSESSMENT DECISION DOCUMENT
PHASE II RFI/RI WORK PLAN**

Page #	Line #	Commentor: Timothy Lovseth	Part VI
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- VI-i **Comment:** Prepare an Executive Summary.
- Response:** An executive summary has been added.
- VI-x **Comment:** Many acronyms used in this report are not presented in the "List of Acronyms." Also, terms such as corrugated metal pipe, Interceptor Trench Pump House and Rocky Flats Alluvium should not be referred to as acronyms. Overuse of acronyms makes the report difficult to read and understand.
- Response:** The acronym list has been updated and acronyms removed as possible.
- 2-1 40 **Comment:** Groundwater vs. ground water vs. ground-water . If you use the two-word form of ground water, then you must use a hyphen when this form is used as an adjective.
- Response:** Corrections made.
- 2-1 26 **Comment:** There may be more than one working definition for the Lower HSU, however the original intent was for it to be a substitute descriptive term to be used in place of the term "aquifer." HSUs are not aquifers at RFP.
- Response:** Clarification on HSUs acknowledged.
- Figure 2.0-1 **Comment:** The location of Bowman's Pond should be shown on this map. Consider combining location maps where appropriate.
- Response:** The map has been revised.
- figure 2.1-1 **Comment:** The coverage of interpreted data stops at the south end of the ponds. Why not extend the contours to the south to be consistent with other maps presented in this section?

		Response:	The map has been revised.
2-4	11	Comment:	Do you mean to reference the 1993 Draft Well Evaluation Report?
		Response:	The reference has been clarified.
figure	2.1-2	Comment:	A more accurate title would be "... Surficial Materials, Second Quarter, 1992," because the map includes water level measurements from some wells completed in deposits of non-alluvial origin.
		Response:	The map has been revised for clarification.
figure	2.1-3	Comment:	Monitoring well 3386 is not a bedrock monitoring well. This misidentification appears on all subsequent maps relating to bedrock monitoring or proposed activities.
		Response:	This well is in the weathered bedrock at approximately 25 feet.
3-23			
15, 27, 33, 37, 42		Comment:	No reference map is provided that shows the location of the wells and trenches under discussion.
		Response:	The requested map has been included.
3-32	35	Comment:	This discussion of the Upper HSU should be rewritten referencing the accepted definition of Upper HSU provided in the October 15, 1993 report entitled, "Groundwater Protection and Monitoring Program Plan." Weathered claystones also are part of the Upper HSU.
		Response:	A revised definition of the Upper HSU which includes weathered, fractured claystone and siltstone, in addition to subcropping sandstone, has been incorporated into sections 3.3.1, Ground Water Hydraulics. In addition, a conceptual hydrogeological model with definitions of the upper and lower HSU was added (figure 2.1.1) to this work plan.
3-36	5	Comment:	Delete this sentence.
		Response:	Change was made as requested.

3-36 8

Comment: ... high and low water levels, respectively, in the surficial materials component of the Upper HSU.

Response: The term "unconsolidated materials portion of the upper HSU" has been substituted for "alluvial water" in this sentence. The term "unconsolidated materials" has been substituted for "alluvial materials" throughout the document.

3-36 16

Comment: The ITS only desaturates the **alluvium**. Is this a true statement? Water level measurements made in monitoring wells located north of ponds indicate that some bedrock sandstones are unconfined. Are these sandstones unconfined (partially dewatered) because of the ITS?

Response: This statement is based on upper HSU potentiometric surface maps (figures 3.3-1 and 3.3-2) which show desaturated alluvium (unconsolidated materials) in the ITS. Proposed Phase II weathered bedrock wells (figure 5.3-2) located in the ITS are designed to provide data on the depth to ground water within the ITS. This information can then be used in the Phase II report to determine if the ITS is desaturating bedrock.

3-36 37, 40

Comment: Again, the alluvium is not considered an aquifer because it does not meet defined requirement of being capable of yielding water in substantial quantities to wells or springs.

Response: The term "alluvial aquifer" was replaced with "unconsolidated materials" and "unconsolidated materials portion of the upper HSU" on lines 37 and 40, respectively.

Figure
3.3-4 3.3-5

Comment: What are these maps trying to show? The legend does not make sense (alluvial structure contour with interval)! What are the blank polygons suppose to represent?

Response: The maps intend to show potential groundwater migration pathways. Note the narrow bands of saturated alluvium extending from the ponds area to the northwest toward North Walnut Creek. The blank polygons outline areas of unsaturated alluvium. The term "alluvial structure contour with interval" has been changed to "ground water

potentiometric contour". The blank polygon line has been modified for clarity.

Figure 3.3-6

Comment: The water-level measurements that are below the bottom of the screen are not valid. The well is dry during this condition in spite of the fact that water-level measurements were obtained.

Response: It is assumed that readers of this document will be aware of this limitation in the data. The data collected in the field are presented on the hydrograph. Non-valid data was NOT used in preparing potentiometric surface maps.

3-43 25

Comment: The Geosciences project designed to validate all aquifer test data has not been completed. Use published data with caution.

Response: The Phase II work plan was written with available data. Aquifer pumping tests are proposed to provide additional, site specific hydraulic conductivity values. The phase II report will include a thorough discussion of all available aquifer characteristic data. A cautionary note was added to the footer in Table 3.3-1.

3-47 21

Comment: Claystone porosity is a function of the inherent crystal structure of clays as well as the degree of fracturing. Mixing is probably more related to the permeability or hydraulic conductivity of the claystone. Obviously, fractures will enhance permeability.

Response: "...claystone porosity..." has been changed to "...claystone permeability..." on line 21

figures 3.3- 10
through 3.3-15

and Table VI.3.3-2

Comment: Suggested revisions to cross-sections B, C & E have been made previously and submitted as comments to Part II.3. Also, consider the comments regarding the legend for each cross section and Table VI.3.3-2 that were made suggesting ways to clarify the intended meaning of each lithofacies.

Response: The revised cross sections and table from the part II document will be incorporated into this document.

figure 3.3-16	<p>Comment: The legend should clearly state the meaning of each symbol used in this figure. Were some points omitted to simplify this figure?</p> <p>Response: Legend has been clarified. No points were omitted except for the KAL background wells screened in the "number one" sand which are included in the Upper HSU. All information was adapted from the 1993 Background Geochemical Characterization Report.</p>
3-57 18 - 35	<p>Comment: Contrary to the title of this section, this discussion does not seem to be about upgradient water quality.</p> <p>Response: The lack of clearly up-gradient wells does make this title inappropriate although the discussion is about "local background" ground water quality which is presumed to be up-gradient. The title has been changed to read "Upper HSU Background Ground Water Quality In the Vicinity of OU4".</p>
figures 3.4-8 through 3.4-11	<p>Comment: These figures are impossible to read. The inserted diagrams should be larger and the print should be clearer.</p> <p>Response: The figures have been reproduced at a larger scale.</p>
figure 3.5-2	<p>Comment: Redraw this diagram. Many lines are unlabeled and positioned incorrectly. This diagram should represent your understanding of potential pathways.</p> <p>Response: Improvements to the drawing were made.</p>
Table VI.53-1 and Figure 5.3-1 to -3	<p>Comment: Before the final draft, substitute RFEDs location codes for the temporary well (or station) numbers presented in the text, tables and figures.</p> <p>Response: Following RFP EG&G protocol, a series of location code numbers will be assigned to this project by the EG&G Sample Management Department. The series assigned will be documented in the Implementation Plan for this work. As drilling progresses, location numbers will be sequentially assigned to the wells, and the temporary</p>

numbers in the work plan will no longer be utilized. Records will be kept tracking work plan number and the EG&G assigned numbers to ensure completion of FSP activities. These numbers will remain in the field records, but all subsequent references to the well/sampling location will utilize the EG&G assigned number.

5-25 general

Comment: This work plan does not propose actions that are consistent with the DQOs. Specifically, the vertical extent of contamination and contaminate fate and transport in the unweathered bedrock will not be determined according to this work plan. VOCs and RADs have been detected in the deepest monitoring well suggesting that groundwater in the Lower HSU has been impacted. The authors imply an upgradient source for the observed constituents, however, what evidence exists to determine which direction is upgradient?

Response: The unweathered bedrock system warrants further investigation, as the commentor implies. Additional investigation has been proposed in the FSP.

5-31 39

Comment: The plural form is awkward.

Response: The correction was made.

5-32 general

Comment: It will be very difficult to perform pump test in these units because of the anticipated low yield. An alternate plan to determine the storage coefficient should be developed in the event the constant-rate pump testing fails.

Response: Because of the anticipated low yields, the pumping tests proposed in the FSP employ equipment designed to pump and measure flow at very low rates. If the tests are not successful, the aquifer storage coefficient must be estimated, as other OUs have done.

5-42 general

Comment: Consideration should be given to installing surface casing during the drilling of the "alluvial" wells. If surface or near surface soil contamination is anticipated, surface casing may help assure that any samples collected will be representative of subsurface conditions.

Response: The following sentence was added to line 3, page 5-42.
"Where surficial soil contamination is known or suspected,
a temporary, short (12 to 18 inch) casing will be cemented
into place to prevent contamination from migrating
downhole."

5-41 37 **Comment:** ... avoid cross contamination between hydrogeologic units,
...

Response: "upper and lower aquifers" has been changed to
"hydrogeologic units".

5-51 41 **Comment:** This procedure is currently being modified. By the time
this program starts generating Investigation Derived
Waters, the Decon Pad will no longer accept contaminated
water.

Response: The text has been modified to reflect new procedures
storing and disposing of purge and development water as
per SOP FO.05 (Revision 2).

**COMMENTS AND RESPONSES
TO THE OU4 IM/IRA
ENVIRONMENTAL ASSESSMENT DECISION DOCUMENT**

- VI-ii **Comment:** E comment. The title "IV.3.4.5 Air Quality" is incorrect. It should be changed to "VI.3.4.5 Air Quality."
- Response:** This correction has been made.
- VI.2-4 9 **Comment:** N comment. The text states that "initial interpretations indicate that downward vertical gradients exist between the unconsolidated materials and the weathered bedrock". If this is the case, then an explanation should be included as to why some wells are screened across both zones.
- Response:** An explanation concerning the screens is not made in the work plan. The objective of the work plan is to present current knowledge as the basis for further field investigations, not to critique past work.
- Figure VI.2.1-7 **Comment:** N comment. This figure presents volatile organic compound (VOC) concentrations in alluvial groundwater. There are no indications of which wells were sampled to arrive at the constructed contours. There is no tabulated data to identify the concentration at each location. This figure should be modified accordingly to present useable data, including identification of which wells were sampled, sampling dates, and concentrations at each location.
- Response:** The figure has been revised to more clearly present the information.
- VI.3-23 15-16 **Comment:** N comment. The two wells referenced (2-66 and 3-66) have not been identified on the associated figure. There is no lithologic or completion information presented for either of these wells. This comment also applies to many wells identified that are on the figures but not included in the appendix or in the original workplan. All wells referenced should be shown on the figure, and the location of completion information should be referenced.
- Response:** Detailed information regarding wells drilled in the 1960's, 1970's and early 1980's is often incomplete and generally not considered useable when compared to more recent (post 1989) data. Section VI.3.1 was intended to be a review of existing data and not a detailed analysis of previous work.

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The posting on a map of boreholes or wells which have been abandoned was considered unnecessary for this Phase II Work Plan.

Borehole drill logs from 1986, 1987 and 1989 are included in Appendix B of the Phase I RFI/RI Work Plan. 1993 Phase I borehole logs are included in Appendix I of the Phase I RFI/RI report.

VI.3-33 5-10 **Comment:** N comment. An analysis of all water level data collected and presented in the appendix has not been included in the text. This task would appear to be an integral part of characterization of the Upper Hydrostratigraphic Unit (UHSU). A comparison of potentiometric heads in the alluvial aquifer and the weathered bedrock aquifer should be presented for those locations where the two are adjacent. Given the volume of data available, a cursory analysis should be included in this section.

Response: It is unclear as to which appendix you are referring. The Phase II Work Plan does not intend to fully characterize the Upper (or Lower) HSU, but only to identify additional data needs. A comparison of potentiometric heads in paired surficial materials/weathered bedrock wells is included in the 1992 RCRA Ground Water Report (Table 2-2). A detailed analysis of OU4 water level data is provided in Section II.3.3.5 in the Phase I report. A cursory analysis of the data to identify additional data needs has been provided in Section VI.3.3.1.

VI.3-33 28 **Comment:** N comment. A value of 1×10^{-2} centimeters per second is identified as a low hydraulic conductivity in the text. This is representative of a sand and is not generally considered a low hydraulic conductivity. The text should be revised so that 1×10^{-2} centimeters per second is not identified as a low hydraulic conductivity.

Response: The text has been modified as requested.

VI.3-33 35-40 **Comment:** N comment. This section describes the hydraulic gradient of the bedrock system. The potentiometric map used to arrive at these values should be referenced.

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Response: This paragraph has been re-written for clarity and the potentiometric surface map reference has been added.

Figure VI.3.3-1, 8 **Comment:** N comment. Figures VI.3.3-1 and VI.3.3-8 present the potentiometric surfaces of the alluvial and weathered bedrock aquifers, respectively. Each data point used to construct the contours should be shown on the figures. Otherwise, only the interpretation is presented, without the data to support the placement of the contours.

Response: The values used to construct these maps have been added to the maps.

VI.3-65 42-43 **Comment:** N comment. The text states that the interceptor trench system (ITS) effectively collects the contaminated groundwater plumes in surficial materials downgradient of the Solar Evaporation Ponds (SEPs). However, figures VI.3.4-2, VI.3.4-3, and VI.3.4-5 show a large plume emanating downgradient (northeast) from the ITS. This exception to the effectiveness of the ITS should be identified in the text.

Response: This paragraph has been rewritten and clarified. Reference to the exception in the effectiveness are covered in the following paragraph which has also been rewritten.

VI.3-66 1-2 **Comment:** N comment. The text states that a nitrate-contaminated groundwater plume is present in surficial materials and is not collected by the ITS. A plume containing radioactive contaminants also emanates from the same area, as shown on Figure VI.3.4-2. Only the nitrate plume is identified. The text should be modified to reflect all of the plumes.

Response: This paragraph has been rewritten and now contains explicit reference to contaminated "plumes" other than that of nitrate.

VI.3-66 3-5 **Comment:** N comment. The text states that at its northeast extent, the ITS is constructed above the top of bedrock elevation and consequently cannot collect all groundwater flows in the surficial materials at this location. If the ITS is successful in capturing contaminated groundwater upgradient of this point, it does not seem logical that a contaminant plume

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would be continuing beyond the point where the ITS is tied into bedrock.

The fact that the ITS is not tied into bedrock may be a partial explanation, but more alluvial wells should be installed to determine if there is a paleochannel or other source. The preferential flow path figure presented in Part II of this document (Figure II.3.5-17) shows the existence of a paleochannel through this area. The text should include all possible causes for the contaminant plume extending beyond the ITS.

Response: This paragraph and associated discussions have been rewritten to more fully address the issue of ITS failure to fully intercept contaminants. A proposed monitoring well has been positioned to test the possibility of contaminant migration along a suspected preferential pathway (a projected paleochannel) located in the eastern area of the ITS. A more complete discussion of ITS construction details and evidence for bedrock "keying" is presented in Appendix A.

VI.3-74 17-30 **Comment:** N comment. Almost all of the background concentrations presented in Table VI.3.4-1 are not consistent with those presented in the text in Part II. The text should be corrected so that the reported background concentrations are consistent throughout the document.

Response: The values were corrected to be consistent with the Phase I RFI/RI report.

VI.3-75 17 **Comment:** N comment. The bis(2-ethylhexyl)phthalate maximum concentration reported in Part II is 24,000 micrograms per kilogram (ug/Kg), but is reported at 21,000 ug/Kg at this citation. The text should be corrected so that the concentrations reported are consistent throughout the document.

Response: The values were corrected to be consistent with the Phase I RFI/RI report.

VI.3-76 33 **Comment:** N comment. The maximum concentration reported for plutonium-239/240 in Part II is 925 pCi/g. The maximum

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reported at this citation is 4 pCi/g. The text should be corrected so that the information is consistent.

Response: The values were corrected to be consistent with the Phase I RFI/RI report.

VI.3-78 15-16 **Comment:** N comment. Distinct trends of detection of phthalate esters are noted in the nature and extent section of Part II. However, these contaminants are discounted at this citation as being attributed to laboratory or sampling contamination even though the data validation process has not been completed. Until the data validation process results in the removal of these contaminants from consideration as actual contaminants, they should be treated as contaminants. The text should be corrected.

Response: It is unclear what trends the commentors are citing from the Phase I Report. It is the interpretation of the authors of both the Phase I Report and the Phase II Work Plan that the phthalate ester detections are the result of lab contamination. Validation of these samples will not change this interpretation.

VI.3-80 7-15 **Comment:** N comment. The text and figures present the highest contaminant concentrations detected over a given period, but not all contaminant concentrations detected during one sampling event. Presentation of the highest concentrations detected does not provide an indication of trends in the data. Combining concentration data from all VOCs onto one map does not adequately characterize the contaminant plumes or help identify potential individual sources for the different VOCs. Since trends in the contaminant concentrations help to identify data gaps, all of the analytical groundwater data should be presented.

Response: The maps have been regenerated showing the levels of all VOCs detected at each well during 1992, and the contours have been removed. Presently, there are not enough data to accurately characterize trends in VOC contamination.

VI.3-82 4 **Comment:** N comment. The text references well B209189. This well is not identified on Figure VI.3.4-1. It is unclear if this is

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a typographical error or if the well was deleted from the figure.

Response: The sentence has been corrected to reference well B208089.

VI.3-92 18 **Comment:** N comment. The text states that "the bedrock system discharges to surface via seeps on the hillside." This conclusion was not identified or supported previously in the text. The previous discussion (in Part II) indicated that the seeps were a result of alluvial groundwater discharging at the bedrock contact. A discussion should be included to distinguish which seeps are representative of bedrock groundwater or alluvial groundwater.

Response: The text has been corrected to agree with the assessment of the seeps in the Phase I RFI/RI Report. At present, all of the seeps are interpreted as points of groundwater discharge from the unconsolidated materials. Sampling and characterization of all seeps is planned as a part of the Phase II investigation.

VI.3-95 4 **Comment:** N comment. The text states, "The degree of connection between contamination beneath and near the SEPs and contamination bordering North Walnut Creek cannot be discerned due to the lack of groundwater monitoring stations between these two areas. The alluvium in this area is unsaturated." Based upon plotting of the bedrock surface in this area, there do appear to be areas of saturated alluvium, namely in possible paleochannels identified in Part II (shown on Figure II.3.5-17). A number of logs were reviewed and alluvial thicknesses of up to eight feet were identified in an apparent channel. The resistivity data presented also supported the presence of a paleochannel in the area described.

VI.3-94 4 The text identifies a lack of data, yet additional alluvial wells are not proposed in this area. Wells installed in weathered bedrock will not provide information on alluvial groundwater contamination, although they will serve a different purpose. The workplan should be revised to include the installation of alluvial wells to determine

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whether there is seasonal saturation of alluvium in this area.

Response: The text was corrected to read "The unconsolidated materials are unsaturated over much of this area. Results of the Phase I RFI/RI show, however, that there are areas of saturated unconsolidated materials in bedrock channels within the ITS. The FSP addresses the possibility of contaminant transport in the unconsolidated material through the ITS." An additional well screened in the unconsolidated materials will sample ground water within eastern end of the ITS. This well is located in one of the paleochannels noted in Figure II.3.5-17 of the Phase I RFI/RI Report. Furthermore, the alluvium is not expected to be completely unsaturated at this location since the ITS is not keyed into bedrock at its eastern-most extent. This sampling location will provide water quality data for water which is flowing in the unconsolidated materials and beneath the ITS.

Additional water quality data within the ITS will be collected from piezometer 44893 during the Phase II field program. This piezometer is screened within the unconsolidated materials and is located in a bedrock channel within the limits of the ITS.

Figures
VI.3.4-8 to -11

Comment: N comment. The apparent objective of the cited figures is to present concentrations of different contaminants in surface water near OU4. The maps are not useful at the scale presented as most of the information is illegible. Furthermore, no analytical data are presented for occurrences of OU4 surface water. The figures should be modified to correct these deficiencies and analytical data should be provided.

Response: The figures have been reproduced at a larger scale. The reference has been corrected to EG&G, 1992 which is the 1990 Surface Water and Sediment Geochemical Characterization Report. This reference has been added to the list. The figures are presented to summarize the surface water quality in the area of the solar ponds. The reader should refer to the 1990 Surface Water and

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Sediment Geochemical Characterization Report for more detailed information.

Table VI.3.4-4 **Comment:** N comment. This table presents a statistical summary comparison of groundwater analytes in the SEPs to background concentrations. No analytical data have been included in this section to support the concentrations determined by the statistical analyses. Additionally, the reference for these analytical concentrations is identified as "EG&G, 1991." This reference is not included with the references comprising Section 10 of Part VI nor is it referenced properly if it is in the comprehensive reference list included with Part II Section 7. There are four EG&G references for 1991 in the comprehensive reference list. The analytical data should be included or correctly referenced in the text.

The data source for the analytical contour maps (EG&G, 1990) has also not been included in the reference section. The analytical data used to generate the contour maps should be reported in this document. An adequate evaluation of proposed Phase II activities cannot be accomplished without reviewing the data that were evaluated for the proposed activities.

Response: The reference for figures VI.3.4.8 through 11 was corrected to EG&G, 1992 which is the 1990 Surface Water and Sediment Geochemical Characterization Report. This reference was added to the list of references in Section 10 of the work plan. The figures are presented to summarize the surface water quality in the area of the solar ponds. The reader should refer to the 1990 Surface Water and Sediment Geochemical Characterization Report for more detailed information.

VI.3-106 23 **Comment:** E comment. The title "IV.3.4.5 Air Quality" is incorrect. It should be changed to "VI.3.4.5 Air Quality."

Response: The correction was made.

VI.3-106 23-38 **Comment:** N comment. This section only considers plutonium contamination as part of the radiological airborne pollutants. Other radiological contaminants such as

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americium-241, uranium-233, uranium-234, uranium-238, and tritium were not considered. The additional radiological contaminants should be included.

These contaminants are regularly reported to the public in the Rocky Flats Monthly Environmental Monitoring Report.

Response: Paralleling the Rocky Flats Plant Site Annual Environmental Monitoring Report, plutonium is presented as representative of airborne radiological contaminants.

VI.3-106 23-38 **Comment:** S comment. This section only considers airborne contamination data from two ambient air monitoring program (RAAMP) samplers, SS25 and SS4. In general, air quality monitoring is a site-wide issue and should be treated as one. Segregating the monitoring data by operable units rather than on a site-wide basis can lead to erroneous conclusions. Since airborne contaminants can travel great distances, the review of air monitoring data should not be restricted to samplers in the immediate vicinity of the potential emissions source such as OU4. Data from many other samplers surrounding OU4 (such as SS5) should be included in this review.

Response: The data from all RAAMP samplers were reviewed. No trends or higher levels of plutonium were found at other air sampling sites. The air quality data from samplers near OU4 are presented to show the air quality near OU4.

VI.3-107 4-7 **Comment:** S comment. The text states that worker exposure to airborne organics and metals does not pose a significant health threat. Data for airborne organics and metals should be included in the report to verify this statement.

Response: The cited reference contains data for airborne organics and metals.

VI.4-5 3-5 **Comment:** N comment. Stream gauging is not identified as a task proposed during Phase II activities. Based upon identified deficiencies in the data needed for characterization of the relationship between North Walnut Creek and the alluvial groundwater system, stream gauging of North Walnut

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stream gauging of North Walnut Creek upstream of the contaminant plume should be proposed.

Response: Characterizing surface water and its interaction with alluvial and bedrock systems has been added to the Phase II objectives in section 4.1.3. The gauging station nearest to OU4 is located on North Walnut Creek down stream of OU4 and upstream of retention pond A-1. Options for setting up additional stream gauging stations on North Walnut Creek are currently being discussed with EG&G's Surface Water Division. Final stream gauging plans will be incorporated into the implementation plan.

VI.5-2 25-31 **Comment:** N comment. The text presents an analytical synopsis, stating "for a representative view, the compound or compound group(s) having the highest occurrence rate was used as an indicator of the group." A determination of the validity of using a compound as an indicator of a group cannot be accomplished without presentation of the groundwater analytical data. The data should be presented.

Response: Presentation of all historic ground water data is not within the scope of a work plan. The references for the data have been provided.

VI.5-4 12-14 **Comment:** N comment. The text states, "comparing the occurrence of analytes by group in surface soils and boreholes indicates that detection rates are lower in the subsurface soils indicating less impact of analytes with depth." This statement is not accurate for all of the contaminants. Many of the metals, and some of the radionuclides did not exhibit this trend. Furthermore, additional soil samples were not collected at depths below many of the identified hot spots. Consequently, this conclusion is based upon biased sampling. Therefore, use of a contaminant as representative of a group appears to be potentially invalid for some of the groups.

Response: The text has been rewritten to address the discrepancies.

VI.5-4 32-40 **Comment:** N comment. The text states that "it is reasonable that data

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validation will result in elimination of the VOCs in borehole soils." If the data validation process has not been completed, and, therefore, conclusions regarding deletion of contaminants have not been made as part of the validation process, then statements regarding dismissal of contaminants are not relevant. Speculation on results not yet available seems inappropriate.

Response: The text has been rewritten to provide clarification.

VI.5-6 4-5 **Comment:** N comment. The text states that "though conceivable, surface soil contamination cannot be realistically considered a viable source to the groundwater systems." Given the shallow depth to groundwater in some areas of the site (less than three feet) it seems that surface soil can realistically be a potential source of contamination to groundwater. The Toxicity-Characteristic Leaching Procedure (TCLP) test should be conducted on samples from a number of the hot spots to evaluate this potential. The text should discuss the potential for surface soil to contaminate groundwater in more detail.

Response: The "hot spots" the commentor is referring to are not clear. Nonetheless, the text has been rewritten to provide clarification.

VI.5-14 16-22 **Comment:** N comment. Some of the wells proposed for sampling are screened across the alluvium and into bedrock. The purpose of sampling these wells is not clear. If these wells represent mixing of different water-bearing zones, the data will be useless. The rationale for groundwater sampling of these wells should be clarified in the text prior to initiating the sampling program.

Response: With only one or two exceptions, the bedrock monitoring wells and piezometers are screened and sand-packed entirely below the unconsolidated materials/weathered bedrock contact. One exception is downgradient bedrock well 3086; the sand pack for this well extends above this contact by only 0.3 feet. Therefore, the data obtained from these wells can be considered to be representative of the bedrock groundwater. The majority of the wells identified with the unconsolidated materials have screens and filter

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packs which extend into the uppermost portion of the weathered bedrock. However, approximately 80 percent of these wells extend less than 3 feet into the weathered bedrock. Groundwater quality in this uppermost 3 feet of the weathered bedrock is not anticipated to be significantly different from groundwater quality in the unconsolidated materials due to effects of mixing. Therefore, groundwater from these wells will be considered representative of the unconsolidated system.

The remaining 20 percent of the unconsolidated materials wells have filter packs which extend 3 to 8 feet into the bedrock. Groundwater quality data from these "hybrid" wells can not be assigned to the unconsolidated materials or the weathered bedrock. However, the data will be indicative of the presence or absence of contamination in the UHSU, and therefore will be of value. In addition, if contamination is detected in these "hybrid" wells, the presence of contamination in both the unconsolidated materials and the weathered bedrock can probably be assumed due to the effects of mixing. Conversely, non-detections of contamination probably indicate that both the unconsolidated materials and weathered bedrock are uncontaminated.

VI.5-14 24-38 **Comment:** N comment. Data presented in Part II of this document indicated that the alluvium north of the SEPs is not always dry. Generally one to two feet of saturated alluvium was present above the bedrock. No additional piezometers are proposed in this area for Phase II. As only a few previously installed piezometers which were completed in the alluvium exist in this area, a large data deficiency still exists for this area. This deficiency should be reevaluated and the justification for not installing additional wells in this area should be included in the text.

Response: A well screened in the unconsolidated materials will be added in the eastern portion of the ITS as shown on Figure VI.5.3-1 to investigate the presence and quality of groundwater in that area. The information presented in Appendix A regarding the effectiveness of the ITS indicates that the western portion of the ITS is keyed into bedrock.

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Therefore, the unconsolidated materials in this area are expected to be unsaturated. This conclusion contradicts the referenced data in Part II. However, the interpretations presented in Part II which indicate the presence of 1 to 2 feet of saturation above the weathered bedrock are tenuous due to the sparsity of control in the vicinity of the ITS. There may be at least 1 to 2 feet of error in the inferred groundwater surface presented in Part II.

Table VI.5.3-2 **Comment:** N comment. This table presents the proposed bedrock and alluvial wells but is very misleading. For example, the first activity listed in the left-hand column is to "install alluvial aquifer/upgradient of well A-1." However, the intent appears to be to install a well identified as A-1 upgradient of Pond 207-C. Therefore, the text of this column should be modified to clarify the proposed well identification and the objective clearly.

Response: The table was revised.

VI.5-31 35 **Comment:** N comment. The references for slug test analysis are identified, including the Bouwer and Rice (1976) methods. There were significant modifications to this method described in the article entitled, "The Bouwer and Rice Slug Test-An Update" published in 1986. Failure to use this method modification will provide erroneous data and analysis. This reference should be added to the text and utilized in analysis.

Response: "The Bouwer and Rice Slug Test-An Update" (1989) paper gives additional guidance for the method of interpreting slug tests given in the 1976 paper. The concepts presented in the 1989 paper will be incorporated in the interpretations of the slug tests, and a reference to the 1989 paper has been added to the text.

VI.5-32 25-30 **Comment:** N comment. This section describes the proposed monitoring during pumping tests in the weathered bedrock aquifer. Any alluvial wells/piezometers properly completed in this area should also be monitored during the pumping test and recovery periods. These data are easy to collect and may provide backup information on interconnection of

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the alluvial and weathered bedrock systems in different areas of the site.

Response: Existing wells and piezometers will be utilized during pumping tests.

VI.5-32 36-44 **Comment:** N comment. This section describes the fourth proposed pumping test, but information is deleted. This section should be completed.

Response: The sentence fragment was a typographical error and has been removed.

VI.5-32 40-43 **Comment:** N comment. This sentence states that additional piezometers will be installed at this location. The locations of the new piezometers are not included on Figure VI.5.3-5. The locations should be identified.

Response: Data from slug tests will be used to finalize the design of the pumping tests and location of the piezometers. This observational approach is in agreement with the SOPs for pumping tests.

VI.5-37 26-44 **Comment:** N comment. According to information presented in Part II, Section 3, ground penetrating radar (GPR) was unsuccessful in locating the objects of interest. Seismic refraction was successful in meeting the Phase I objective of locating the bedrock channels. Therefore, it seems wasteful to attempt GPR a second time, even with a new objective. It may be more cost-effective to run seismic lines as proposed in combination with drilling additional boreholes to locate the bedrock surface. As presented, the GPR does not seem warranted and should not be conducted.

Response: The GPR conducted as part of the Phase I RFI/RI was successful in locating buried pipes and trenches. As stated on page 5-40 lines 1-3, the Phase II GPR program proposed in the FSP will employ a different instrument with lower frequency antennas to maximize the depth of penetration. Thus, the GPR survey is warranted.

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VI.5-37 44 **Comment:** E comment. Line 44 has not been completed. A few important words appear to be missing.

Response: The words "successful at" were added to the end of line 44.

VI.5-42 **Comment:** N comment. This section describes the proposed groundwater sampling activities for Phase II. It is not clear whether sampling will include total or dissolved Target Analyte List metals. This should be distinguished in the text and tables. Additionally, if dissolved metals samples are collected, a description of the field filtering methods should be identified, including filter mesh size. These items apply to surface water sampling as well.

Response: An additional table (new Table VI.5.4.1) has been created to address these valid comments. The new table clearly identifies requirements for both total and "dissolved" analytes based on field filtration using 0.45 μ m membrane filters.

VI.5-42 9-11 **Comment:** N comment. This section describes the proposed well construction. Sumps in the proposed wells are not identified in this text section, but sumps are identified in the well completion diagram (Figure VI.5.4-2). Sumps into a different zone are not recommended. For example, sumps that extend from the alluvium into bedrock may provide erroneous data.

Response: According to EMD Operating Procedure No. GT.6. Rev. 2, ("Monitoring Wells and Piezometer Installation") p. 6/18 and DCN 93.01 (EG&G Manual No. 5-21000-OPS-GW, Vol. II, Groundwater), "... after the auger have been advanced to the bedrock contact, an appropriately-sized drive sampler will be driven 2 to 5 feet into the claystone bedrock to provide a pilot hole, no more than 1 inch greater in diameter than the outside diameter (O.D.) of the casing, for a 2-foot deep sediment sump and to classify the bedrock lithology below the contact.". Accordingly, existing wells have been constructed with a sump into the bedrock and descriptions of proposed wells do not necessarily include sumps since they are specified in the SOPs.

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Figure General **Comment:** N comment. All of the figures in the entire document should be modified to distinguish weathered bedrock wells from unweathered bedrock wells.

All of the figures should utilize and post a better coordinate system so that those unfamiliar with the site can locate wells without a complete survey of the site. For example, a coordinate grid is recommended that has letters posted across the top and numbers along the side. A coordinate for a well may then be given as A2, and only an area of roughly one square inch would have to be reviewed by the reader to locate the well.

Response: We agree that such an X-Y reference system would be useful but unfortunately would require a prohibitive expenditure of time and manpower to modify the large number of existing maps. Consideration will be given to this suggestion in the future when exercising the option does not require rework.

General **Comment:** N comment. Water levels were spot-checked and compared to the top of the screened interval. In a few wells, the water level was above the top of the screen for many measurement dates. These wells included, but are not limited to 207889, 210489 and 208589. Even though light, non-aqueous phase liquids (LNAPLs) have not been detected at OU4, this information should be provided somewhere in the text because it indicates that screen placement could potentially bias analytical results for compounds that exist as LNAPLs. This information should also be utilized to determine seasonal highs and direct future screen placement.

Response: We agree that situations such as those existing in the cited wells compromises the recognition and evaluation of potential LNAPLs. A number of procedural and logistic factors contribute to the occurrence of these and similar cases. To the extent that it is possible to mitigate these factors, future well installations will attempt to prevent reoccurrences. Amended Figures VI.5.4.2 and VI.5.4.3 now show the ideal position of screened intervals with respect to maximum water table elevations (i.e., maximum water table elevations should be below the top of the

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screen). In order to meet this ideal, maximum water table levels at proposed well locations will be predicted based on nearby wells and factored into the specifications for the new monitoring well construction. This procedure should be more effective than simply using water table levels at the time of drilling as the basis for setting screens because of the seasonal variability in water table elevations. It should be noted, however, that various SOPs (esp., 5-21000-OPS-GT.6 Rev.2) impose requirements on the construction of the upper portions of monitoring wells that may compromise screen placement with respect to water table elevations. Specifically, a minimum of 2 feet of bentonite seal and a minimum of 3 feet of high-solids, reduced-pH bentonite grout must be placed above the top of the filter pack which itself must extend at least 6 inches above the top of the screen (see Figure GT.6-2 of the above-cited SOP). Thus the top of the screen must be a minimum of 5.5 feet below the surface. In the case of each of the wells mentioned in this comment these requirements prevented placement of the top of the screens above the highest water table elevation. In fact, these wells did not adhere to the minimums specified in 5-21000-OPS-GT.6 Rev.2 (i.e., less-than-required bentonite seal and grout were used) and the water table was still above the screen. In short, despite best efforts to address the valid concerns in this comment, it will not always be possible to do so.

General

Comment: N comment. A discrepancy was noted during spot-checking. The screened interval at well B219489 is from 18 to 24 feet below ground surface. Bedrock is present at a depth of 22.5 feet. During drilling, groundwater was encountered at 12 feet, and the static water level was reported at 12 feet following well completion. The materials below 12 feet are only noted as damp. These data indicate that a perched groundwater table may exist at a depth of 12 feet. If the saturated materials at the 12-foot depth are sealed off and the screen is in the interval above the bedrock surface, the presence of perched groundwater may be missed. Care should be taken during Phase II field activities to avoid missing perched groundwater. As only spot-checking was accomplished in this review time frame, there may be other wells where similar conditions exist.

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Response: We absolutely agree that this is valid concern, but procedural and logistical requirements present some obstacles to avoiding the problem in the future. If a situation similar to that of B219489 arises and is recognized again (i.e., significant water is encountered at a position above the anticipated ground water table elevation), a monitoring well will be constructed to screen the upper water-producing (perched) horizon. Another proximal "twin" monitoring well will then be constructed so as to isolate the upper perched horizon and screen the next deeper (unconsolidated material) water-producing horizon.

A problem exists, however, in identifying the perched water-producing horizon during the drilling operation. Assuming conventional auger drilling is used, a moist core may indicate a perched horizon but open-hole time may be required to determine if the horizon will actually produce sufficient water to merit a separate screened interval. Such open-hole time may pose a cross-contamination risk to lower units if drilling proceeded past the moist zone into the lower water-bearing unit and the hole may cave in. Assuming resonant-sonic drilling is used (as currently planned for this investigation), recognition of a moist zone in the core will require pulling back the drill casing to expose the moist zone and allowing open-hole time. In either case, timely recognition of the potentially perched zone will be difficult, proving the viability of the zone as a water-producer will be problematic, and open-hole stand-by time will be expensive.

Field personnel will be advised of the potential for perched horizons at a given location based on review of nearby monitoring well installation histories and geologic logs. If observations at the time of drilling support the presence of a perched zone, appropriate steps will be taken to screen that interval separately.

General

Comment: N comment. Many of the lithologic logs and well completion diagrams for the site that were used in data analysis were not provided and documents were not referenced for where the data could be found. All of the supporting information should be provided or referenced.

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Section VI.7
General

Response: References for lithologic logs and well completion diagrams were added to text in section VI.3.3.1.2, in the paragraph discussing geologic cross sections.

Comment: S comment. Section VI.7, which is intended to describe how the baseline risk assessment (BRA) will be conducted, has not yet been submitted. Therefore, it cannot be determined if the BRA will be conducted in a manner consistent with the risk analysis presented in Part III. Furthermore, it is unclear how discrepancies will be resolved if the results of the BRA conflict with the risk analysis presented in Part III. These issues need to be addressed when the BRA workplan is available for review.

Response: The BRA is included in this draft of the work plan.